

ASSIGNMENT V -- SOUND MASS

1. Select a time span (5 minutes minimum).
2. Divide the span into 5 sections.
3. Create a different sound mass for each segment/section. Vary your dynamic levels. Use any combination of "instruments" (sound producers) that you like.
4. Create your own system of notation or use existing methods.
5. Score your composition. Be sure to include a "key" (directory) to your system of notation on your manuscript.

GRADING:

1. Correct calculations of total time span and sections	11
2. Variety of sound masses	11
3. Variety of dynamic levels	11
4. Availability and practicality of instruments	11
5. Imaginative use of timbre	11
6. Rhythm	11
7. System of notation -- clarity, ease of comprehension	11
8. Correct manuscript	11
9. Form	11

Cacophony of Construction Becomes Symphony

Mortar mixers blend with oboes in salute to industry

By JEFF BAENEN, Associated Press

ST. LOUIS PARK, Minn. Roll over, Beethoven, and tell Tchaikovsky the news: If you thought rock 'n' roll was loud, you haven't heard the "Groundbreaker Overture."

Sounds of an automatic nail gun, a brick saw and a mortar mixer blend with those of oboes, clarinets and trombones in composer Stephen Paulus's [born 1949] salute to the construction industry.

The 7-minute piece was performed Wednesday evening with the help of construction workers wearing hard hats and tuxedos during a groundbreaking ceremony for an \$80 million development project in this Minneapolis suburb.

Cries of "Bravo" greeted the end of the performance, which began as a cacophony of construction noises but melded into the strains of the musical instruments. The concert was punctuated by the sounds of grinding and sawing and ended with a single shot from a nail gun.

'Turn on and let run'

"I thought it was delightful to see a marriage of the arts and the trades," said Linda Hoeschler of St. Paul, who was among the crowd of about 300.

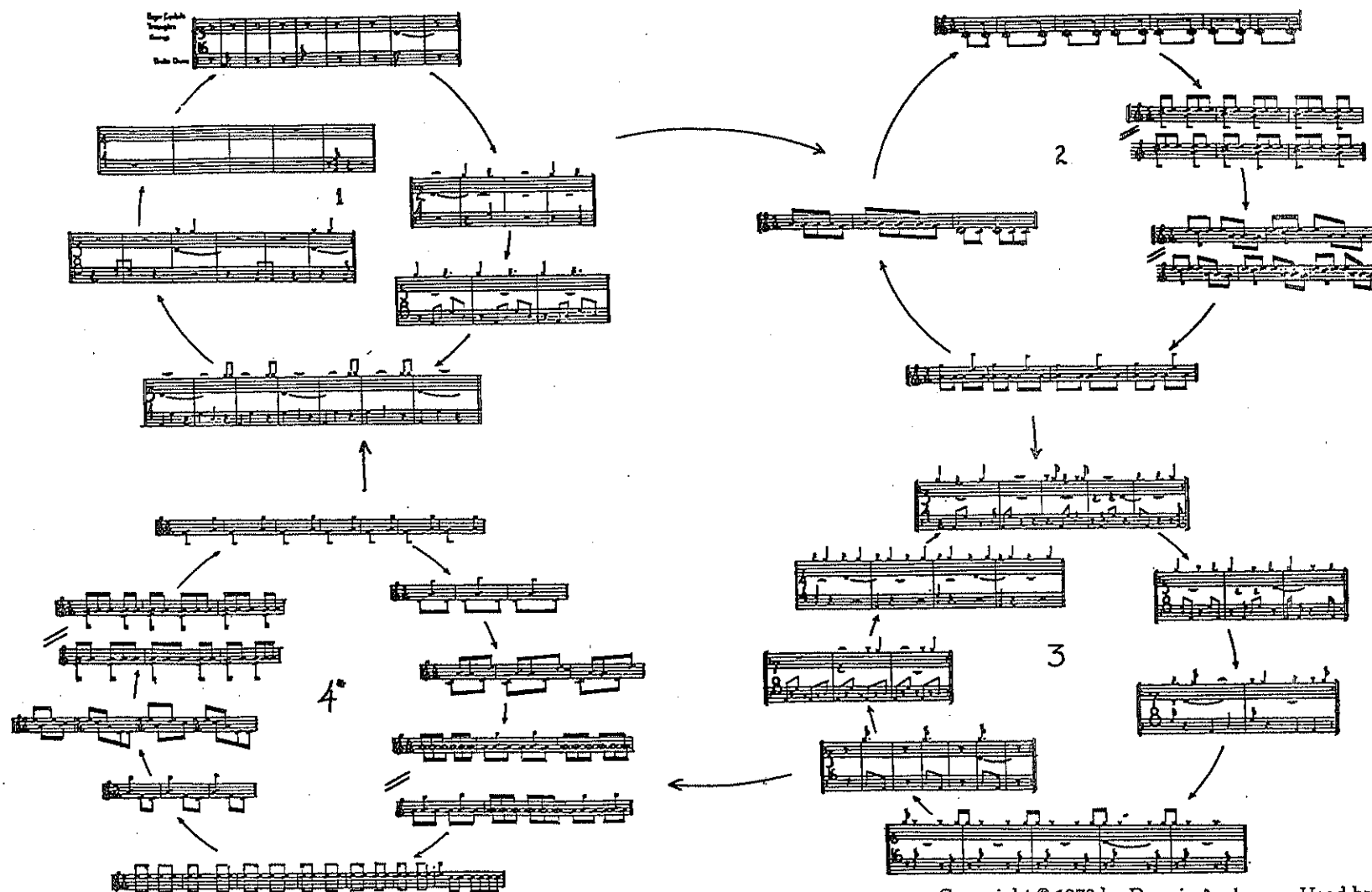
The musical score includes such directions as "turn on and let run" for the mortar mixer and "start rotation slowly. Increase to full speed" for a trowler, which spreads cement.

"You can say they're discordant but there's a way to use them with the orchestra to treat them musically," said Paulus, 38, who composed the overture after visiting construction sites and warehouses in August and making a tape of sounds he found interesting.

He then went home to St. Paul and composed the piece in about a month by playing on a piano and writing on drafting paper.

Instructions

This piece is for solo marimba and percussion ensemble. All players begin on circle corresponding to their number. Soloist waits for Player 1 to finish his circle. Each player in the ensemble plays his circle and moves around the big circle to the next circle. Accompaniment dynamics should not reach above *mf*. Upward stems indicate right hand — all of these notes are $\flat$. Downward stems indicate left hand — all of these notes are $\sharp$. Soloist repeats measures 221 to 230 until the entire ensemble is in unison on that section. As soon as measure 221 is played in unison, the ensemble moves on to the end. Marimba dynamics are to be added at the discretion of the soloist. All strong beats should be accented. [The four ensemble parts are reproduced on pp. 101-104.]



Breath Pieces

Carole Weber

Notes on the Breath Pieces:

The breath pieces were part of people pieces made to be done by people visiting a little glade in a forest near Art Park, New York.

The idea is that the scores are handed out to people as they gather in the glade. We sit roughly in a circle. One way the piece is done: I say:

I will begin each sound saying what it is (say bah with breath). You continue making the sound until you hear me say the next sound. Or: you can make any sound on the page in any order. Listen to yourself and to how long you want to make each sound. Change when you want. Do each sound on the page at least once. Listen to how everyone sounds at once. Make silences too. Listen.

BREATH PIECES

BLOWING YOUR BREATH OUT VERY FAST....
ARUSH.
SAY **HAAWAAEEE** w/ BREATH
FORMING OH WITH MOUTH SAYING HUH w/ BREATH.

Blowing your breath out very slowly; But loud; But soft.
SAY **OOOOOOO** w/ BREATH
FORMING OO w/ MOUTH SAYING HOO WITH LOTS OF BREATH SAYING HOO w/ LITTLE BREATH for a long time

Puffing out the cheeks w/ air expel sharply. expel fast hit cheeks
FORMING EEE w/ MOUTH SAYING HEE w/ BREATH FAST RUSHING SAYING HEE w/ BREATH SLOWLY
SAY **HA AAAA---HOO---HEE** WITH BREATH... HA OOE...

FORMING YEAH w/ MOUTH SAY AE HHH softly w/ BREATH.
FORMING AHH w/ MOUTH SAYING HAH w/ BREATH.

SAYING HEH w/ BREATH
SAYING **SASASASA**

SAYING SHEEEEEEE with BREATH
SAYING **SHEEAHAYEE**

SAYING PA..PA..PA..PA with BREATH
SAYING **BUH..BUH..BUH..BUH** w/ BREATH

SUCKING BREATH IN THROUGH THE TEETH
FORMING shuh w/ mouth sucking in breath thru teeth

FORMING hooo w/ mouth sucking in breath through teeth
SUCKING IN SOUND **HAAWAA EEE** with teeth
Suck in **FOOOOOO**; YAP EE YOO;

SUCKING IN SOUND
Suck in **FOOOOOO**; YAP EE YOO;

ROBERTA'S SONG TO BE SUNG ONCE AS BREATH ONCE AS VOICE (IN CLOUD) EVERY BODY AT THEIR OWN TEMPO

LISTEN TO THE FOREST BREATH SAYING THE SOUNDS
Make up your own breathy sound try it blowing it out; sucking it in

SUCKING SHEEEEEE; FOOOOOO

PA PA PAPA; BUH BUH BUH BUH; SA SA SA SA SA;

SONG ROBERTA GOULD

POPOPOPOPOPOPIPA
PAPA PIPA PAPA POPPI
POPITEETAAETEE
TAH TAH
TEETEEPIPIPIPAPI
POPOPOPO
PIPI TEETEE
CACA
TEETEE
CACA
IXTA
IXTA
MAL
MAL
MAL
MAMI
MIMI MAMA MOMAH
MAMI MOMA MAMA
BABA BABA BABA
BAB BAB
AB AB
ABABABABABAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAA

Piece for guitars no. 1 (any number of players)

Michael Parsons

Players sit spaced well apart,
not in a group. Begin one by
one.

Part 1: each player takes each of the 11 2-beat phrases and plays it over and over alternating the 2 beats regularly (number of repetitions freely chosen). Choose a *different* tempo from any other being played at the time: keep exactly to the chosen tempo for each phrase. Play each phrase in this way once only—play them in any order—between phrases, pause for any length of time (judge it according to the context).

Part 2: each player plays each of the 7 chords once only in any order, with pauses of any length between them. Go on to part 2 any time after finishing part 1 (i.e. without waiting for other players to finish part 1).

Allow each chord to sound for 1-2 seconds, then damp strings.

The image displays 11 guitar phrases and 7 guitar chords, each represented by a musical staff with a treble clef and a key signature of one flat (B-flat). The phrases are numbered 1 through 11, and the chords are numbered 1 through 7. Each phrase or chord is accompanied by a list of fingerings for the six strings, indicated by Roman numerals (I-VI) and superscripts (1-3) for fretting.

Phrases:

- Phrase 1: I¹ II IV
- Phrase 2: I¹ III V¹
- Phrase 3: I⁶ II III
- Phrase 4: IV V VI⁴
- Phrase 5: I³ II⁴ VI
- Phrase 6: I⁹ II⁹ III
- Phrase 7: I² II III
- Phrase 8: I¹ II III IV¹
- Phrase 9: I² II² III³ IV
- Phrase 10: I¹ II² III² IV¹
- Phrase 11: I¹ II² III² IV¹

Chords:

- Chord 1: I³ II³ III³ IV³ V³ VI³
- Chord 2: I¹ II¹ III¹ IV¹
- Chord 3: I¹ II¹ III¹ IV¹ V¹ VI¹
- Chord 4: I¹ II¹ III¹ IV¹ V¹ VI¹
- Chord 5: I¹ II¹ III¹ IV¹ V¹ VI¹
- Chord 6: I¹ II¹ III¹ IV¹ V¹ VI¹
- Chord 7: I¹ II¹ III¹ IV¹ V¹ VI¹

Chapter 8: Sound Mass

For 12 Strings (Rising)

James Tenney

6

$\text{♩} \approx 60$

Handwritten note: (Notes measure 4 should be repeated 100 to 200 times, yielding a total duration of about 7 to 13 minutes)

Chapter 8: Sound Mass

Quartet for Any Number of Wind or String Instruments

Robert Ashley

7

INSTRUCTIONS

SCORE

The score represents a program of sound-actions, not a time-schedule of events. Each action will have its own duration, according to the instructions below. The time interval between successive actions (sounds) is included in the meaning of the note-symbols. Read the score left-to-right, top to bottom, in the conventional manner.

NOTATION

All sounds are to be played very softly (*pp*).

Symbols for notes produced on an instrument represent any pitch of the player's choice. Other dimensions of the notes are as follows:

Tone	the manner of producing the sound
Duration	the length of the note itself
Change	the inflection of pitch during the sound
Spacing	the time interval between the note indicated and the note that follows it.

Tone	ordinary
Duration	very short (dying away very quickly), but not staccato
Change	none
Spacing	any interval that is possible without using a new breath

Tone	ordinary
Duration	very long; one full breath or full bow
Change	up or down, as gradually as possible, over a range of two half-steps
Spacing	as short as possible

Tone	vibrato, very wide and slow (exaggerated)
Duration	very long; one full breath or full bow
Change	none
Spacing	as short as possible

V	Tone	voice sound, any pitch, added to an ordinary tone. (Wind players will sing into their instruments while playing; string players will hum while playing.)
	Duration	very long, one full breath or full bow
	Change	voice only: up or down, as gradually as possible, over any range
	Spacing	as short as possible

N	Tone	any kind of noise, except vocal or instrumental
	Duration	the natural duration of the noise; continuous-type noises can have any duration
	Spacing	as short as possible

	Tone	silence
	Duration	one full breath at a natural pace, not "held" or suspended
	Spacing	no time interval

When any symbol is followed by a breath mark, the breath begins immediately after the note.

PROCEDURE

All players use the same score (or copies).

Individual players begin whenever they are ready.

Start on any breath mark (*).

Perform the program of actions in a continuous manner, beginning again at the top as many times as necessary.

The performance ends when the last player has stopped playing.

OPTIONS

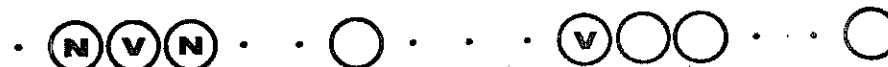
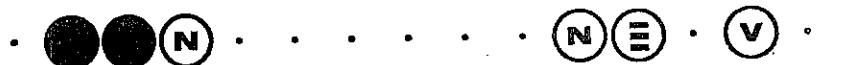
Once during the performance a player may "think through" a sequence of up to four sounds, as if to play, but remain silent.

Once during the performance a player may interrupt his own program of actions to imitate (as closely as possible) the actions and sounds of any player of an instrument different from his own.

Whenever no other instrumentalist is playing (tones or noises), a performer may "think through" any succession of symbols and remain silent. However, as soon as any playing-sound is made, the performer must resume playing.

During the instrumental performance a chorus (or other instrumentalists) may read aloud from any variety of texts—as quietly as possible.

If actors or dancers are used, they should be seated among the players, as though asleep.



BARE SECRET WEAPON

'ATOM'

BOMB

JAPAN

Most Destructive

Force in Universe

The *New York Times* banner headline proclaimed:

FIRST ATOMIC BOMB DROPPED ON JAPAN;
MISSILE IS EQUAL TO 20,000 TONS OF TNT;
TRUMAN WARNS FOE OF 'RAIN OF RUIN'

Three days later, on August 9, a second atomic bomb was dropped on the 270,000 people of Nagasaki.

The uranium weapon known as Little Boy exploded 1,850 feet in the air above Hiroshima with a force estimated at the equivalent of 12.5 kilotons of TNT. The plutonium Fat Man exploded over Nagasaki with a force of 22 kilotons, equivalent to the power packed by 4,000 B-29s carrying conventional bombs. Physicist Shohna Naomi offers a precise description of the Hiroshima blast:

At the moment of the explosion, a fireball with a temperature of several million degrees centigrade and an atmospheric pressure of several hundred thousand bars was formed at the burst point. The fireball rapidly expanded to a sphere with a maximum radius of about 230 meters, emitted particularly strong thermal rays until three seconds after the explosion, and continued to shine for about ten seconds. Because of the thermal rays, the temperature of the hypocenter is thought to have risen to 3,000-4,000 degrees centigrade—far higher than the temperature at which iron melts, 1,550 degrees centigrade.

The destructive power of the bomb was not restricted to its heat.

The strong expansive power of the fireball produced what is known as a shock wave followed by a high-speed wind. . . . The pressure from the shock wave at Hiroshima was extremely destruc-

tive. . . . The wind velocity of the blast at the hypocenter was about 440 meters per second. . . .

Buildings were smashed to pieces and incinerated by the blast and thermal rays, and it was the great quantities of dust from the destroyed buildings, carried by the winds, that cast the city into pitch-darkness just after the bombing.

Atomic Holocaust:

The View From the Ground

"The hour was early, the morning still, warm and beautiful. Shimmering leaves, reflecting sunlight from a cloudless sky, made a pleasant contrast with shadows in my garden," Hachiya Michihiko, director of the Hiroshima Communications Hospital, recorded in his diary of the early morning of August 6.

A student clearing firebreaks recalled her teacher saying, "Oh, there's a B!" and, looking skyward, "felt a tremendous flash of lightning. In an instant we were blinded and everything was just a frenzy of delirium."

A female junior college student recalled the instant of the explosion. "I felt as though I had been struck on the back with something like a big hammer, and thrown into boiling oil. . . . I seem to have been blown a good way to the north, and I felt as though the directions were all changed around."

The force of the blast and the heat of the thermal flash tore away the clothing and peeled away the skin from many of the victims. A young sociologist described "a park nearby covered with dead bodies waiting to be cremated. . . . The most impressive thing I saw was some girls, very young girls, not only with their clothes torn off but with their skin peeled off as well. . . . My immediate thought was that this was like the hell I had always read about."

Hiroshima was in flames. A girl of five at the time of the bombing recalled: "Black smoke was billowing up and we could hear the sound of big things exploding. . . . Those dreadful streets. The fires were burning. There was a strange smell all over. Blue-green balls of fire were drifting around. I had a terrible lonely feeling that everybody else in the world was dead and only we were still alive."

xx INTRODUCTION

A history professor looked down at the city from Hijiyama hill to find "that Hiroshima had disappeared . . . that experience looking down and finding nothing left of Hiroshima—was so shocking that I simply can't express what I felt. . . . Hiroshima didn't exist—that was mainly what I saw—Hiroshima just didn't exist."

Hiroaki Ichikawa, five years old, was trapped under his house but was able to wriggle free. Fleeing the city, at Hijiyama Bridge he saw "naked people with their burnt skin hanging from them like rags. We saw others covered with blood, being carried to safer places on trucks."

Twenty-year-old Shibayama Hiroshi entered Hiroshima on foot from his suburban workplace within hours of the bombing. Crossing the Kyobashi River he encountered a scene reminiscent of "a painting of hell."

Floating there were scores of dead bodies, faces swollen to twice their normal size and trouser-encased legs stiff as logs. The upper half of one body was burned black and the lower half swollen and waterlogged. The sight chilled us to the bone. . . . It began to rain. Black stains spotted shirts. The multicolored smoke generated at the time of the blast had become a cloud of dirty brown and black hanging like a pall over the city. It was a demonic ceiling, a malediction.

Returning to the city the next day he encountered a sight he would never forget:

a man, his face burned and his blue clothes in shreds, riding along apathetically with what looked like black wood fastened to his bicycle with coarse straw rope. As he approached, we saw that what we had taken for wood was a stiff, blackened corpse, probably the remains of a loved one. The man himself seemed crazed. All the inhabitants of Hiroshima appeared deranged.

Okabe Kosaku, a young soldier, entered Hiroshima on the afternoon following the bombing to find a burnt-out wasteland. "Burned into my memory is the sight of a young mother, probably in her twenties, a baby on her back and a three- or four-year-old child

THE U.S., JAPAN, AND THE ATOMIC BOMB

clasped tightly in her arms. Caught against a girder of the bridge, her body bobbed idly in the gentle current." Approaching Hiroshima station, he observed that

Houses had been shattered and their inhabitants buried in a welter of tiles and plaster, their naked bodies covered in ashes. Here and there an arm or a leg protruded. Other bodies lay strewn about, their stomachs torn open and their entrails pouring into the ashes. . . . The expressions on the dead faces as they gazed emptily into space were more contorted and agonized than those of the fierce gate-guardian deities of Japanese temples.

Sato Kiyoko, a third grader, entered a darkened Hiroshima at night two weeks after the bombing in search of her mother. "No life disturbed the dead streets," she later wrote.

What was more frightening than anything else was the sight, in the moonlight, of the skeleton of a burned-out streetcar with its load of fire-blackened passengers. One corpse was still clinging to a strap. I could see trails of silvery phosphorus weaving all about, for all the world like the spirits of the dead in my storybooks.

Survivor accounts of the agony and destruction of terror bombing are among the most important and neglected documents of modern war and the nuclear era.

In both Hiroshima and Nagasaki, 50 percent of all those located within 1.2 kilometers (three-quarters of a mile) of the hypocenter died on the day of the explosion, and 80–100 percent of those exposed at this distance eventually died from wounds or radiation inflicted by the bomb. Within five months, the atomic bomb claimed the lives of 140,000 of Hiroshima's 350,000 people and 70,000 of 270,000 people in Nagasaki. Many more subsequently died from bomb-related injuries. In Nagasaki, the victims included more than 8,500 of the city's 12,000 Roman Catholics whose residences clustered near the great cathedral close to ground zero, and a high percentage of the city's 10,000 Korean workers, many of whom had been forcibly brought to Japan to work under virtual slave labor conditions.

On March 9-10, in the worst single firebombing disaster, 100,000 people, 10 percent of Tokyo's one million, died. In Hiroshima, 34 percent of those exposed to the bomb at 1-2 kilometers died within three months. A study conducted in Hiroshima one year after the bombing revealed that 118,661 people, or 37 percent of the civilian population of 320,613, were killed, 3,677 were missing, and 79,130 were injured.

Richard Rhodes plausibly estimates that within five years, Hiroshima's atomic bomb-related deaths numbered nearly 200,000 and Nagasaki's 74,000. No single attack in the annals of warfare exacted so heavy a cumulative toll in human lives as the atomic bombing of Hiroshima. Bomb-related deaths have continued at lower levels in subsequent years down to the present. Hundreds of thousands of others have suffered "death in life," in Robert Lifton's evocative phrase. The victims included not only those who felt the direct effects of blast and fire but tens of thousands of others, including fetuses in utero, who were exposed to residual radiation days after the bombing.

One measure of the destruction of the firebombing and atomic bombing is the comparison with U.S. wartime casualties. The U.S. Armed Forces lost 292,000 troops and very few civilians in all theaters during all of World War II, that is, a fraction of the noncombatants killed in the bombing of Japanese cities in the spring and summer of 1945.

Michael Sherry has reflected on the qualities that distinguished the Tokyo firebombing from the experience of the atomic bomb. Tokyo

was a process of destruction, not a simple act. As the American bombers poured gasoline and chemicals into the inferno, the observer could see the destruction take place and watch the thing come alive, becoming some living, grotesque organism, ever changing in its shape, dimensions, colors and directions. . . . In Hiroshima and Nagasaki, most victims did not know what hit them, confronting personal extinction first; the survivors only later suffered the shock of communal annihilation as they crawled out of their wreckage and met the parade of the damned.

This unfathomable quality of the atomic experience, together with the vastly greater power unleashed, however puny by the megadeath standards of today, and the agonizing physical and emotional toll exacted in the course of subsequent decades, distinguish the atomic bombing from earlier forms of holocaust.

The Decision to Drop the Bomb

The atomic bombing of Japan, and indeed much of the firebombing that preceded it, were directed against a nation that was militarily defeated in all but name yet spurned surrender: isolated and without allies following the defeat of Germany; in full retreat across Asia and the Pacific; its cities and much of its industry in ruins or starved of raw materials; its civilian morale at low ebb; its navy and air force paralyzed; and its armies desperately short of food and supplies, though still largely intact. By spring 1945 Japan lacked the capacity to wage aggressive war beyond its borders against the U.S. and its allies. Soviet troop mobilization to attack Japan in Manchuria on August 15 increased the desperation of the situation. Nevertheless, the Japanese military had not lost its capacity to inflict substantial damage on forces invading the home islands. Halting and inconclusive efforts by Japanese leaders to negotiate acceptable surrender terms assuring the person of the emperor and the continuity of the imperial system through Soviet and Swiss mediation throughout 1945 came to nought. The war continued.

How are we to understand the U.S. decision to drop the atomic bomb? Four mutually reinforcing factors lay behind the action:

- wartime goals that required Japan's unconditional surrender;
- the belief, subtly reinforced by racist stereotypes, that the behavior of Japanese forces, from attacks on Chinese cities in 1937 through Pearl Harbor to the Bataan death march and the rape of Manila in 1945, nullified any humanitarian consideration for the Japanese people;
- the conviction that the atomic bomb would save the lives of numerous American soldiers by obviating a costly invasion of Japan which would otherwise be required to secure surrender;
- the leaders' commitment to establish American primacy and to

after a while I became aware, as if in a dream, of my own groaning and of thick smoke, and while thinking and thinking that something was wrong, I came to my senses. I felt as if I was bathing in grease. Looking at myself I found that blood was streaming all over my body. The bleeding was worst around the left wrist and head; blood was also flowing from the shoulders to the chest. I looked around the room, my eyes wide open. Until just a moment ago I was sure there had been six people, but now I was the only one left, and, as if toy boxes were turned over and pushed to one side of the room, chairs, desks and document shelves were blown off to the side in a great mess. I, too, had been blown there. Smoke streamed in through the door. Collecting myself, I rose. Since my legs were somewhat wobbly, I went out to the hallway holding onto something. I heard low groans from different directions; I looked around, however, to find the building apparently intact. Concerned about my bike, which I had left in the janitor's room with important registration papers strapped to it, I started down the stairs.

On the way down, a woman of about forty (so I thought but she might have been younger) was dead, her mouth, like a wolf's, torn from ear to ear and both eyeballs blown out. It hardly looked like a human face. When I went down to the second floor, I saw several more such people. My feet refusing to move, I stopped and looked down at the courtyard from a second floor window. In the courtyard below, thick yellow smoke was hanging at human height, and above it was a mass of jet black smoke. From the public hall next door a rather thin stream of smoke was approaching. When I saw this, for the first time I felt that some new weapon might have been used.

Then, too, I saw an odd sight through the smoke. Many office girls were walking in a circle in the courtyard, raising their hands as they would in a Bon dance. Half of them were barefooted, and they were all calling: "Mother, please come." "Mother, why aren't you coming?"

Their voices were sad screams that resembled sobbing, in an indescribably pitiful, disagreeable tone. The moment someone diverged, the odd Bon dance circle went out of shape in that direction. And, while becoming now circular and now oblong, it was going round and round in the same way. They seemed like human beings

who had lost all reason. Although in retrospect all might have been able to flee if someone reliable had skillfully guided them, beneath my eyes about ten fell one after another.

I no longer cared about my bike. I ran from the south stairs in the center to the streetcar road. My legs became firmer, though probably only from terror. On the street, electric poles lay on one side like fallen incense sticks. A horse-drawn wagon carrying metal pipes had tumbled and lay on its side, both horse and man having died instantly. I started to walk a little northward, but, frightened by high-voltage electric sparks, I retreated and passed through the west gate of the College of Arts and Sciences in the direction of the Red Cross Hospital. On the campus, where there were as yet no flames, I saw five or six men, probably teachers, talking with few words as though all spirit had gone out of them.

I was worried about my home in Hakushima, but at that point what worried me even more was what had happened to my daughter, who should have been working at the Postal Savings Bureau right near where I was. Passing before the Red Cross Hospital, I looked up at the reddish building. She worked there every day due to student labor mobilization. That morning, she should have left home slightly later than I. With painful thoughts, I paced up and down in front of the building. Injured people flowed into this wide street from different places and all walked toward Ujina. There was also a naked woman who, although not wounded, ran barefooted muttering something unintelligible, her hair in disarray. I grabbed many people to inquire, but none knew about the Savings Bureau. After a while an old man told me, "At the Savings Bureau, they dragged seriously injured people down to the basement."

Approaching the basement entrance, I saw two guard-like men with pickaxes barking, "We'll kill anyone who goes in here." Since my nerves were on edge, however, I tried to break in, paying no attention. One of them blocked me, brandishing his pickaxe: "How dare you break in here?"

"What? Kill me if you like. My precious daughter was drafted for forced labor service: What's wrong about her parent entering to search at such a time? Go ahead, kill me if you can," I yelled loudly. I must have glared at him with a terribly threatening expression.

Cowed, the man put down his pickaxe and let me pass.

Compared with the tumult outside, the basement was gloomy and subdued. I heard low groans here and there.

"Kazuko, Kazuko," I called my daughter's name, my voice resounding in the basement. I walked around, peering at one face after another of the seriously wounded people. Among them were a few young women. Once, I stepped on something soft and limp and jumped back startled. It was a human hand. It belonged to a lean man of about thirty, seemingly already dead.

"Ojisan, ojisan" (sir, sir), a boy called in a low voice, holding out both hands as though asking for help.

"Keep up your spirits. Someone will come soon."

Holding his hands, I think I said something like this. I myself could do nothing for him. I just went outside. I could not find my daughter. Although I went outside, I could not give her up. While gauging the flames visible in all directions near and far and the possibilities of escape, I wandered this way and that, hatless under the scorching sun, until I think it was about eleven. No matter who I asked, no one responded in earnest. Finally giving up, I started to flee, following the lines of people. When I came as far as the Miyuki Bridge and looked from our neighborhood toward Ushita, I saw smoke rising from the shadows of the Ushita mountains. The mountains seemed to have caught fire.

From this point on, my memory is somewhat hazy.

Where was it?—I seem to think it was on the river bank.

I ran through something like an army dump and a split second later fire from across the street licked the whole building.

Around Danbara, everyone I saw told me about what lay ahead. I was trying somehow to reach home.

"It's no use. Even if you went further, you'd just be burnt to death. Every place is a sea of fire," some said, while others said, "The fire isn't as bad as you think. Cheer up."

Then, somewhere, four trucks, I think of the army, were busily working at moving seriously injured people. I was urged to get on. When I asked their destination, I was told that they were taking the injured to Kaita-ichi and Ujina. It was the wrong direction, so I continued to walk on.

When I put together what various people had said, it seemed that I could get to Ushita if I bypassed Hiroshima Station, went through Iwahana, and crossed Nakayama Pass beyond the east parade ground, so I set out intending to do that. If I reached Ushita, I could return to Hakushima, or, even if I failed, I thought I would be able to get some information about my family. When passing Onaga, where the damage was relatively light, someone said, "Sir, you are bleeding heavily. I don't know how far you're going, but why don't you stay here for the night?"

Although I felt grateful, I declined that offer, too.

Soon I came to the pass. By then I keenly felt the pain from my wounds, and my legs were heavy as though there were metal rods in them; it wasn't easy to climb the trail at the pass.

I looked back, resting on the roots of a tree. The entire city was engulfed in black smoke, and although it was still early, the feel of evening dusk hung everywhere, the sun only faintly visible. Beneath my eyes, only the flames on Hiroshima Station were bright red.

Passing seriously injured people lying on both sides of the pass, I walked a little and rested, rested and climbed again. When finally I could no longer walk, I crawled to a hut I happened to find. Peering inside, I saw several soldiers, who invited me in. Among the soldiers was an army captain, who looked like a doctor, accompanied by a woman of about thirty-four or thirty-five. He prepared strong sugar water to revive me. After I drank two cups, my body was suddenly invigorated and I felt elated. I also received from him two green tomatoes and nibbled at them. He gave me no treatment; probably he had nothing to treat my wounds with.

I rose after staying there a while, thanked them, and started to walk again. Now and then I met people coming from the opposite direction. I was the only one walking toward Ushita. A young man passing by tried to stop me: "Don't be a fool, ojisan. Why are you going there? Everyone's fleeing from there. Don't be a fool."

But I shook him off, too. The sugar water had only revived me momentarily: fatigue permeated my entire body. I was walking, half-awake, half-asleep, thinking that the house was no longer there and both my parents and my wife had died. In time big sparks started to fly toward me one after another, and at that point I met another

person, a woman of about fifty, appearing from the opposite direction. From this old woman I heard that Ushita had not burnt, that Hakushima was slow in catching fire, and that many Hakushima people survived, having fled to Ushita. While listening, I felt my legs become light and fell on the grass, losing consciousness.

The Daughter's Story

A fourth-year student at the Second Prefectural Girls' School of Hiroshima, I had been mobilized to work at the Savings Bureau. On the morning of the 6th the alarm sounded, so I waited for the all clear and then left home. When I came to the Hakushima terminal, a streetcar was just about to leave. It wasn't that we had a special promise, but since I always met my friend Yasuko there and went to work with her on the same streetcar, I hesitated a little when I didn't see her, wondering if I should wait for another car. However, I was somewhat late that day and, moreover, the car was conveniently bound for Dentetsu Station (a car bound for Dentetsu Station spared me the trouble of changing at Hatcho-bori), so I made up my mind and got on. Around the time when the streetcar passed Kamiya, I recalled that I had left at school the book *How to Grow Vegetables at Home* which I had promised to lend to the section head a few days earlier. Again I hesitated whether to go to the bank or stay on as far as school to get the book. I decided to go to school first. Besides the book, there was something I wanted to see Teacher S about. I hesitated twice; I don't know what would have happened to me had I acted differently on even one of these two occasions.

Past the Red Cross Hospital, past the Savings Bureau, when the streetcar ran a little further, a terrible blue light flashed, spreading as far as I could see. Instantly I thought that the streetcar had had an accident, and I reflected: what a mistake, after all I shouldn't have taken this car. In fact, of course, it was just the opposite: although the details are unknown, Yasuko seems to have come from the Hakushima terminal to Hatcho-bori on the next car, and while waiting to transfer there she was hit by that light and, seriously wounded, just managed to run home. She died the next day. Well, the car I rode stopped right away and its passengers noisily got off.

As I, too, got off and stood on the street, the world was all dark, visited at that moment by an eerie hush. Forgetting myself, I shouted loudly, "I can't see, I can't see."

The hush, however, lasted just for a second, and soon howls rose everywhere. Voices calling for help, cries complaining of pain, groans—while I was wondering what could have happened, little by little the darkness wore off and changed to a dawn-like color around me. As I looked in that light, those wearing army caps were intact only under their caps; the rest of their facial skin had peeled off in big pieces like loquat peels and was hanging from cheeks and necks. The skin on their hands had also come off. Many people dangled both hands in front of their chests ghostlike, everyone in the same way, the skin hanging. They aimlessly paced this way and that. Their faces and arms where the skin had slid off looked pink. This pink was truly chilling, and, although my father says it is better to avoid exaggeration, I really thought this was hell. I myself seemed without injury of any kind. That day my outfit was navy blue work pants, a half-sleeve gym shirt, and on my feet a pair of clogs. How I had escaped wounds anywhere on my body puzzles me even now. When I noticed, I had only one clog on. I had left the other in the streetcar. When I looked at people wandering left and right, at least everyone had clogs on both feet. Suddenly embarrassed, I thought of going back to the streetcar for my other clog. Putting a foot on the step, I found that the floor of the car had collapsed, and it was in such a mess that I could not get in. I seem to remember that the car was burning, but it may just be that it had broken down. Giving up the clog, I started to run.

After that, I don't remember how I ran, or what road I took. I think I probably didn't pass the Savings Bureau. I remember standing helplessly for a while in front of City Hall, worried about my father. Since my body was fine, many people called out to me "help me, help me." This made me feel helpless. A bloody man lying on the road called for help; an old woman also called, only her hands and face visible beneath a flattened zinc roof. Each time I fled, pretending to close my eyes and covering my ears. I met people coming from the opposite direction spreading rumors that the bridge ahead had burnt down and that oil had been poured into the

Penderecki's *Threnody* (1960), scored for string orchestra, was recognized instantly as a major, ground-breaking contribution to the twentieth-century repertoire. More than any other such work from this period (including those by Ligeti and Xenakis), it has come to exemplify the use of **texture** as the primary basis for musical ideas and their organization. For virtually all of its eight-minute duration, *Threnody* consists exclusively of textural blocks, clusters, and densely intersecting polyphonic strands.

Penderecki's single-minded attention to textural "fabric" can also be observed in his treatment of **pitch logic** and **time**, an approach that ensures that no rhythmic pulse or pitch sequence can be discernible at any given moment. In place of rhythm in the ordinary sense, we have temporal proportion between continuous textures that adjoin or overlap one another; the timing and duration of the works' events are notated in seconds of clock time. In place of note-by-note pitch relationships (intervals or harmonic progressions), there are mainly two kinds of material: (1) pitch clusters and (2) various unorthodox sounds of indefinite pitch, such as playing the highest notes possible, arpeggiating the strings behind the bridge, tapping the soundboard, or bowing on the wood, the bridge, or the tailpiece.

Example 12.1 is representative of the former. Each section of the orchestra plays its own cluster, one instrument to a note, filling up a given pitch range with every possible chromatic and quarter tone therein. These five sound masses of maximum density begin at separate moments (almost imitatively), and then shift pitch level either abruptly or by glissando (with or without tremolo) in a sequence shown by the dotted lines, forming what one might call a texture melody or sound-mass gesture that spans thirty-eight seconds. As to the second category above, nonstandard instrumental techniques, their most astonishing use occurs just over a minute into the piece, when all fifty-two members of the orchestra alternate among these effects in rapid sequence with no consistent ordering or synchronization, resulting in an impenetrable, overwhelming clatter.

Although *Threnody* is not dependent on any kind of calculated precompositional scheme, a large-scale intuitive **process** shapes the interaction of the two fundamentally different sonic phenomena noted earlier (pitch clusters, usually sustained for at least ten seconds and unpitched effects, usually heard in quick succession or brief outbursts). The pathos of the title is reflected in this process, which centers on the brutal contrast and conflict between these materials. About five minutes into the piece, held notes and unpitched attacks do become interwoven and integrated for a time (the only passage, in fact, with conventionally notated rhythm). Ultimately,

however, this gives way to a series of nonpitched percussive attacks, played by whole sections of the orchestra in rhythmic unison. In the end, cluster sonorities attain a grim victory, with the entire orchestra holding out a two-octave, microtonally saturated wall of sound for thirty seconds as it fades from *fff* to *pppp*.

All of this calls for radical methods of **notation**, and the two bars in Example 12.1 are typical. Here the exact pitches in each cluster are given

Krzysztof Penderecki: *Threnody for the Victims of Hiroshima*

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with conventional noteheads, but other aspects of notation are graphic and aleatoric. For example, entrances and other activities are shown only in approximate relation to segments of time, and the actual timing depends on cues from the conductor. Individual performers also have latitude, since the rate and extent of the glissandi are not specified. The Z-like figures in measure 17 indicate a rapid, unevenly bowed tremolo and are one of a dozen esoteric-looking symbols used throughout the score for nonstandard techniques.

On first experiencing *Threnody*, many listeners react most strongly to the work's extraordinary palette of sound color: sonorities may be haunting one moment and frightening the next. These are all the more remarkable when one realizes that they are being produced by a traditional (and unamplified) "classical" string orchestra. It may be especially jolting, in fact, to see the work played in the concert hall; there, the shocking discrepancy between our expectations (the visual "cues" of familiar instruments and musicians in formal dress) and hard-edged reality may upset our assumptions regarding performance ritual. Finally, we might note that Penderecki's concern with cluster sonorities, and his chosen range of experimental timbres, reveal the influence of technology—perhaps subliminal rather than direct—on his aesthetic. The sound world of *Threnody* emulates that of the tape studio. The composer creates the equivalent of white noise, filter effects, percussive envelopes, multitracked repeating loops, and the like, in a brilliant use of string ensemble resources to produce sounds much like those of electronic music.

12Vn I-II 67 68 69

12Vn

10VI

10Vc

8Cb

6" 8" 10"

70

tutti archi

24Vn

10VI

10Vc

8Cb

30"

nical perfection, are beginning at times to seem vaguely obsolete as far as some of the composers' musical ideas are concerned. The possibilities electronic music suggest are altogether likely to make this situation more acute.

In my own opinion, electronic media more than justify their existence if only by the new insight one can gain from them into the nature of sound, musical and otherwise, and above all by a vast quantity of fresh experience they can provide, on the purely acoustical level. They are still in a clearly very primitive stage and it is impossible to say what they may contribute in the future. But they raise the above questions and many others, and the questions will certainly become more acute as the media develop.

Roger Sessions, "Problems and Issues Facing the Composer Today," in Paul Henry Lang (ed.), *Problems of Modern Music* (New York: W. W. Norton & Company, Inc., 1962), 30-33. Originally published in *The Musical Quarterly*, XLVI (1960), 159-71. Reprinted by permission of the original publisher.

152.

The Master of "Organized Sound"

Edgar Varèse (1883-1965) was one of the great mavericks of twentieth-century music. Resolutely empirical and intuitive at a time when most composers sought the security of "systems," Varèse remained true to the spirit of untrammelled exploration voiced at the beginning of the century by Busoni, his teacher. He was equally contemptuous of neoclassicism and of twelve-tone techniques, seeking rather to build a new kind of athematic music based on bold juxtapositions of sonorous blocks. Attracted by innovations in technology, Varèse liked to give his pieces "scientific" titles (*Ionization*, *Hyperprism*, *Integrals*) and was one of the first to employ such early electronic instruments as the Theremin and the Ondes Martenot. Varèse was the only composer of his generation to master the techniques of postwar electronic music and in the last fifteen years of his life enjoyed his greatest prestige. The passages below all date from this late period; they have been excerpted from a compilation of his writings published shortly after his death.

Because for so many years I crusaded for new instruments with what may have seemed fanatical zeal, I have been accused of desiring nothing less than the destruction of all musical instruments and even of all performers. This is, to say the least, an exaggeration. Our new liberating medium—the electronic—is not meant to replace the old musical instruments which composers, including myself, will continue to use.

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Electronics is an additive, not a destructive factor in the art and science of music. It is because new instruments have been constantly added to the old ones that Western music has such a rich and varied patrimony.

Grateful as we must be for the new medium, we should not expect miracles from machines. The machine can give out only what we put into it. The musical principles remain the same whether a composer writes for orchestra or tape. Rhythm and Form are still his most important problems and the two elements in music most generally misunderstood.

Rhythm is too often confused with metrics. Cadence or the regular succession of beats and accents has little to do with the rhythm of a composition. Rhythm is the element in music that gives life to the work and holds it together. It is the element of stability, the generator of form. In my own works, for instance, rhythm derives from the simultaneous interplay of unrelated elements that intervene at calculated, but not regular time lapses. This corresponds more nearly to the definition of rhythm in physics and philosophy as "a succession of alternate and opposite or correlative states."

As for form, Busoni once wrote: "Is it not singular to demand of a composer originality in all things and to forbid it as regards form? No wonder that if he is original he is accused of formlessness."

The misunderstanding has come from thinking of form as a point of departure, a pattern to be followed, a mold to be filled. Form is a result—the result of a process. Each of my works discovers its own form. I could never have fitted them into any of the historical containers. If you want to fill a rigid box of a definite shape, you must have something to put into it that is the same shape and size or that is elastic or soft enough to be made to fit in. But if you try to force into it something of a different shape and harder substance, even if its volume and size are the same, it will break the box. My music cannot be made to fit into any of the traditional music boxes.

Conceiving musical form as a resultant—the result of a process, I was struck by what seemed to me an analogy between the formation of my compositions and the phenomenon of crystallization. Let me quote the crystallographic description given me by Nathaniel Arbiter, a professor of mineralogy at Columbia University:

The crystal is characterized by both a definite external form and a definite internal structure. The internal structure is based on the unit of crystal which is the smallest grouping of the atoms that has the order and composition of the substance. The extension of the unit into space forms the whole crystal. But in spite of the relatively limited variety of internal structures, the external forms of crystals are limitless.

Then Mr. Arbiter added in his own words: "Crystal form itself is a *resultant* (the very word I have always used in reference to musical form) rather than a primary attribute. Crystal form is the consequence of

the interaction of attractive and repulsive forces and the ordered packing of the atom."

This, I believe, suggests, better than any explanation I could give, the way my works are formed. There is an idea, the basis of an internal structure, expanded and split into different shapes or groups of sound constantly changing in shape, direction, and speed, attracted and repulsed by various forces. The form of the work is the consequence of this interaction. Possible musical forms are as limitless as the exterior forms of crystals.

I should like you to consider what I believe is the best definition of music, because it is all-inclusive: "the corporealization of the intelligence that is in sound," as proposed by Hoëne Wronsky [1778-1853]. If you think about it you will realize that, unlike most dictionary definitions which make use of such subjective terms as beauty, feelings, etc., it covers all music, Eastern or Western, past or present, including the music of our new electronic medium. Although this new music is being gradually accepted, there are still people who, while admitting that it is "interesting," say, "but is it music?" It is a question I am only too familiar with. Until quite recently I used to hear it so often in regard to my own works, that, as far back as the twenties, I decided to call my music "organized sound" and myself, not a musician, but "a worker in rhythms, frequencies, and intensities." Indeed, to stubbornly conditioned ears, anything new in music has always been called noise. But after all what is music but organized noises? And a composer, like all artists, is an organizer of disparate elements. Subjectively, *noise* is any sound one doesn't like.

Our new medium has brought to composers almost endless possibilities of expression, and opened up for them the whole mysterious world of sound. For instance, I have always felt the need of a kind of continuous flowing curve that instruments could not give me. That is why I used sirens in several of my works. Today such effects are easily obtainable by electronic means. In this connection it is curious to note that it is this lack of flow that seems to disturb Eastern musicians in our Western music. To their ears it does not glide, sounds jerky, composed of edges of intervals and holes and, as an Indian pupil of mine expressed it, "jumping like a bird from branch to branch." To them apparently our Western music seems to sound much as it sounds to us when a record is played backward. But playing a Hindu record of a melodic vocalization backward, I found that it had the same smooth flow as when played normally, scarcely altered at all.

The electronic medium is also adding an unbelievable variety of new timbres to our musical store, but most important of all, it has freed music from the tempered system, which has prevented music from keeping pace with the other arts and with science. Composers are now able, as never before, to satisfy the dictates of that inner ear of the imagination.

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They are also lucky so far in not being hampered by aesthetic codifications—at least not yet! But I am afraid it will not be long before some musical mortician begins embalming electronic music in rules.

We should also remember that no machine is a wizard, as we are beginning to think, and we must not expect our electronic devices to compose for us. Good music and bad music will be composed by electronic means, just as good and bad music have been composed for instruments. The computing machine is a marvelous invention and seems almost superhuman. But, in reality, it is as limited as the mind of the individual who feeds it material. Like the computer, the machines we use for making music can only give back what we put into them. But, considering the fact that our electronic devices were never meant for making music, but for the sole purpose of measuring and analyzing sound, it is remarkable that what has already been achieved is musically valid. They are still somewhat unwieldy and time-consuming and not entirely satisfactory as an art-medium. But this new art is still in its infancy, and I hope and firmly believe, now that composers and physicists are at last working together, and music is again linked with science, as it was in the Middle Ages, that new and more musically efficient devices will be invented.

I am not impressed by most of today's electronic music. It does not seem to make full use of the unique possibilities of the medium, especially in regard to those questions of space and projection that have always concerned me. I am fascinated by the fact that through electronic means one can generate a sound instantaneously. On an instrument played by a human being you have to impose a musical thought through notation, then, usually much later, the player has to prepare himself in various ways to produce what will—one hopes—emerge as that sound. This is all so indirect compared with electronics, where you generate something "live" that can appear or disappear instantly and unpredictably. Consequently, you aren't programming something musical, something to be done, but using it directly, which gives an entirely different dimension to musical space and projection. For instance, in the use of an oscillator, it is not a question of working against it or taming it, but using it directly, without, of course, letting it use you. The same pertains to mixing and filtering. To me, working with electronic music is composing with living sounds, paradoxical though that may appear.

The essential touchstone for me was Busoni's prophetic book, *Sketch for a New Aesthetic of Music* [see above, p. 421]. This predicts precisely what is happening today in music—that is, if you pass over the whole dodecaphonic development, which in my view represents a sort of hardening of the arteries. I find the whole twelve-tone approach so limiting, especially in its use of the tempered scale and its rigid pitch organization. I respect the twelve-tone discipline, and those who feel they need such discipline. But it seems much more fruitful to use the total sonic

resources available to us. Although there are certain works of Schoenberg that I find magnificent—the *Five Orchestra Pieces* [see p. 428] especially—his orchestration often seems quite thick and fat. Compare this to the transparency and lyricism of Webern!

I respect and admire Milton Babbitt [see above, p. 509], but he certainly represents a completely different view of electronic music from mine. It seems to me that he wants to exercise maximum control over certain materials, as if he were above them. But I want to be *in* the material, part of the acoustical vibration, so to speak. Babbitt composes his material first and then gives it to the synthesizer, while I want to generate something directly by electronic means. In other words, I think of musical space as open rather than bounded, which is why I speak about projection in the sense that I want simply to project a sound, a musical thought, to initiate it, and then to let it take its own course. I do not want an *a priori* control of all its aspects.

Excerpted from Edgar Varèse, "The Liberation of Sound," and Gunther Schuller, "Conversation with Varèse," in Edward T. Cone and Benjamin Boretz (eds.), *Perspectives on American Composers* (New York: W. W. Norton & Company, Inc., 1971), 29–33, 38–39. Reprinted by permission of the editors of *Perspectives of New Music*.

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The Music of Chance

At the opposite pole from the "total organization" practiced by postwar twelve-tone composers stands the work of John Cage (1912–). Deeply influenced by the quietism of Zen Buddhist philosophy, and intrigued by notions of "indeterminacy," which were assuming increasing prominence in contemporary science, Cage—along with a handful of other composers whom he names below—attempted to create a music totally independent of the creator's will. To do this he resorted to chance operations (sometimes whimsical, as in his famous *Imaginary Landscape* for twelve radios), which seemed to challenge the most basic and time-honored assumptions of Western musicians. Ironically, it was the interest shown Cage in the 1950s by the younger generation of "total serialist" composers like Boulez and Karlheinz Stockhausen (1928–), who invited him to lecture at their summer school in Darmstadt, that led to Cage's work being taken seriously by a significant number of his contemporaries. In the extract given below, Cage muses engagingly and candidly about his work and offers an apologia for what has become known as "aleatoric" music (from *alea*, Latin for dice); that is, the music of "unmediated chance." He traces the lineage of his tendency to the Dadaist movement in European art of the post-World-War-I period, but characterizes it nonetheless as a uniquely American manifestation (Henry Cowell is ac-

TIMBRE

So far, rhythm has been regarded as a primary basis for understanding contrapuntal textures. However, timbral and dynamic factors are also extremely important in the creation of contrapuntal voices. In some works, especially those of composers such as Penderecki and Varèse, timbre has assumed a dominant role over other parameters through a stratification of timbral sonority that might be regarded as *contratimbral* organization (as distinct from the traditionally assumed role of discrete pitches in determining textural strands of *counterpoint*). Contratimbral or polytimbral texture involves the combination and succession of various separate and composite timbres. Often such timbres include non-pitched sounds, sounds of indeterminate pitch, percussive sounds, electronic or recorded sounds, or combinations of any of these.

Example 2-52 shows three excerpts from Penderecki's *Threnody: To the Victims of Hiroshima*, for 52 stringed instruments. This work explores contratimbral string effects using both precise and indefinite pitches. The legend provided by the composer for the players' realization of notational symbols for the unusual string effects employed in the work is also reproduced here.

Example 2-52(a) reveals twenty-four violins in a combined crescendo of sustained pitches each of which represents the "highest note of the instrument (indefinite pitch)," indicated at the point of inception on the previous score page. Obviously twenty-four players so directed will produce a composite indeterminate pitch, since each of the twenty-four may theoretically arrive at a different highest pitch. This timbre is to be produced without vibrato, in contrast to the wide vibrato of the sound in the group representing Violins 6–10. These two timbral layers or masses are superposed above the collective and staggered entrances of ten celli, each group of which presents a series of string effects involving both percussive and bowed articulations. This textural unit is in a sense polytimbral, since four streams of *modes of attack* are introduced at different points in time and sustained for approximately fifteen seconds. The basses join the ten violins mentioned earlier to form a kind of web, enveloping the celli. Motion is achieved both by the series of dissimilar events in the celli and by the crescendo of the surrounding strings. Also, the conflict of high, indiscriminate pitches produces the illusion of constant vacillation, although from a different viewpoint this facet of the texture is essentially static.

The succeeding textural event amounts to a fifteen-second intensification of the preceding one through a widening of the vibrati of the upper violins, an increase in the number of instruments in the middle layer of mixed bowed and struck sounds, and a transformation of the wide vibrato in the low strings into a very rapid one, marked ♩ . At this point in the score the upper and lower strings actually exchange articulations.

EXAMPLE 2-52. (a), (b) and (c) and legend. Penderick: *Threnody*; score pages 6, 12, and 13. Copyright 1969 by Polskie Wydawn Muzyczne. Used by permission of Polskie Wydawn Muzyczne and Belwin Mills Publishing Corp.

ABBREVIATIONS AND SYMBOLS

ordinario	ord.
sul ponticello	s. p.
sul tasto	s. t.
col legno	c. l.
legno battuto	l. batt.
raised by $\frac{1}{4}$ tone	†
raised by $\frac{3}{4}$ tone	‡
lowered by $\frac{1}{4}$ tone	b
lowered by $\frac{3}{4}$ tone	♭
highest note of the instrument (indefinite pitch)	▲
play between bridge and tailpiece	↑
arpeggio on 4 strings behind the bridge	⋈
play on tailpiece (arco)	⋈
play on bridge	↑
percussion effect: strike the upper sounding board of the violin with the nut or the finger-tips	⋈
several irregular changes of bow	π V
molto vibrato	~~~~~
very slow vibrato with a $\frac{1}{4}$ tone frequency difference produced by sliding the finger	~~~~~
very rapid not rhythmicized tremolo	Σ

A

1-6
7-12
13-18
19-24
1-5
10Vla.
6-10
10Vc.
1-4
8Cb.
15°

ordinario
s. p.
s. t.
c. l.
l. batt.
†
‡
b
♭
▲
↑
⋈
⋈
↑
⋈
π V
~~~~~  
~~~~~  
Σ

Each instrumentalist chooses one of the 4 given groups and executes it (within a fixed space/time) as rapidly as possible.

EXAMPLE 2.52 continued
Chapter 8: Sound Mass

12Vn. 1-12

12Vn. 13-24

10Vla. 1-10

10Vc. 1-10

8Cb. 1-8

15" 7" 5"

5Vc. 1-5

5Vc. 6-10

Solo 3.vibr.

10" 7" 10" 5"

4Vn.

5Vla. 2

5Vc. 2

1.batt.

2Cb.

15"

4Vn.

5Vla. 2

5Vc.

2Cb.

15"

EDGARD VARÈSE

IONISATION

for

Percussion Ensemble

of

13 Players

Full Score

Duration: 6½ minutes

COLFRANC MUSIC PUBLISHING CORPORATION
NEW YORK

11. Güiro
Castagnettes (Castanets)
Glockenspiel à clavier, with resonators
12. Tambour de Basque (Tambourine)
2 Enclumes, la première plus aiguë (2 Anvils, the first higher)
Grand Tam-tam (very deep)
13. Fouet (Slapstick)
Triangle
Grelots (Sleigh Bells)
Piano G)

A) A mallet in each hand.

B) A mallet in each hand; use very elastic strokes; even in the *ff*, the combined weight of arm and mallet are sufficient; do not kill the tone.

C) Skin, felt, sponge or wooden sticks are to be used strictly as indicated.

R
The notation  indicates rim shot.
X

D) Sirens: Sterling Type H (Part No. 73 PU. PB.) hand operated with thumb brake. If unobtainable, substitute with theremin instruments. Mouth sirens are to be strictly avoided.

E) Tarole: A flat military high pitched drum with snares.

F) Cencerro: A cow bell with handle and no clapper: it is struck with drum stick and muffled by inserting a piece of soft material in the bell.

G) The symbol  indicates all chromatic intervals between the

two notes and must be played simultaneously making use of the forearm. The chord is to be played without stiffness and without brutality.

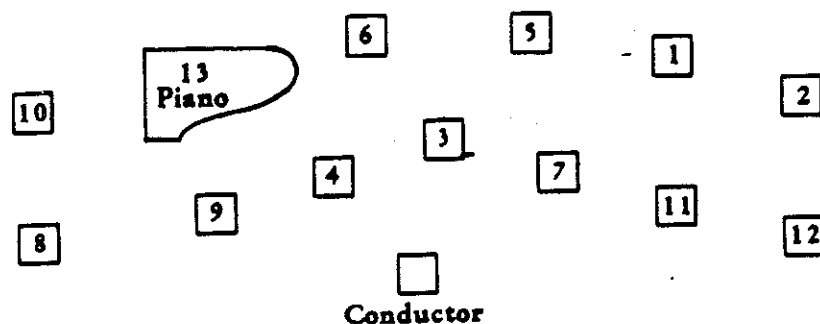
Instruments

1. A) Grande Cymbale Chinoise (Crash Cymbal)
Grosse Caisse, très grave (Bass Drum, very deep)
Cencerro (muffled) *F*)
Tam-tam clair (high Tam-tam)
2. B) Gong
Tam-tam clair (high Tam-tam)
Tam-tam grave (low Tam-tam)
Cencerro (muffled) *F*)
3. 2 Bongos (high and low)
Caisse roulante (Side-drum) *C*)
2 Grosse Caisses à plat, moyenne et grave (2 Bass Drums laid flat, medium and large size)
4. Tambour Militaire *C*)
Caisse roulante (Side-drum) *C*)
5. Sirène claire (Siren, high) *D*)
Tambour à corde (String-drum or Lion's Roar)
6. Sirène grave (Siren, low) *D*)
Fouet (Slapstick)
Güiro
7. 3 Blocs chinois, clair, moyen et grave (3 Wood Blocks, high, middle and low register)

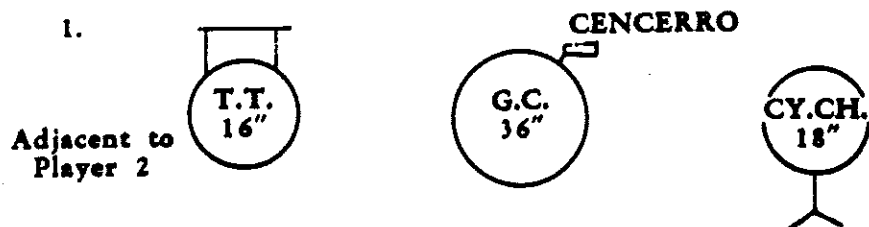
Claves
Triangle
8. Caisse claire, détimbrée (Snare-drum, with snares relaxed) *C*)
2 Maracas, claire et grave (2 Maracas, high and low)
9. Tarole *C*) *E*)
Caisse claire (Snare-drum) *C*)
Cymbale suspendue (Suspended Cymbal)
10. Cymbales (Cymbals)
Grelots (Sleigh Bells)
Cloches (Tubular Chimes)

• IONISATION •

Chart for disposition of Percussion Ensemble suggested by Morris Goldenberg,
Instructor of Percussion, Juilliard School of Music.



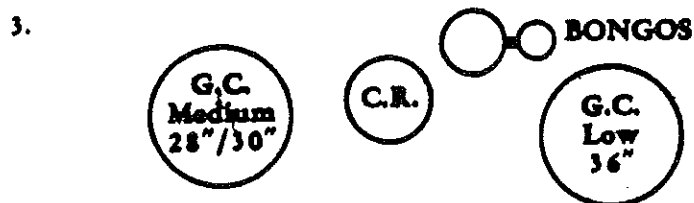
Charts for Individual Multiple Percussionists



Footnote: Use soft Timpani mallet at outset. After ⑦ use Bell mallet in R.H. for Cowbell and Timpani mallet in L.H.



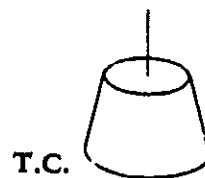
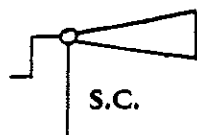
Footnote: See prototypes for Gong and Tam-Tam at end of section.



Footnote: Both Bass Drums are to be laid flat.

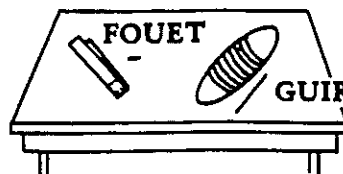
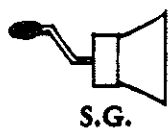


5.



Footnote: See prototypes of High Siren and String Drum at end of Section.

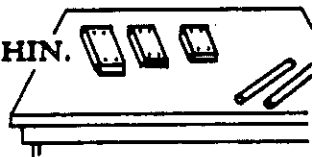
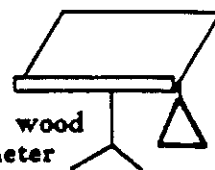
6.



GUIRO — 13" IN LENGTH

Footnote: See prototypes of Low Siren at end of section.

7.

BLOCS. CHIN.
(3)CLAVES
Hard maple wood
1-1/4" diameter
x 10" in length.TRIANGLE ON
MUSIC STAND

Footnote: Use Chinese Blocks (or the equivalent Wood Blocks) of 3 different pitches. Do *not* use Temple Blocks.

8.

NO DIAGRAM NECESSARY

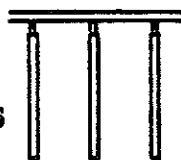
9.

TAROLE
12"/15"CY.S.
18"C.C.
15"

Footnote: The shell of the Tarole is extremely shallow.

10.

CLOCHES

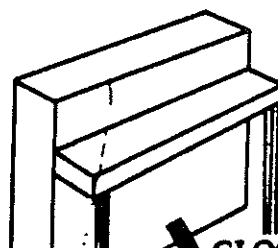
HAND
CYMBALS

GRELOTS

CY.S.
18"

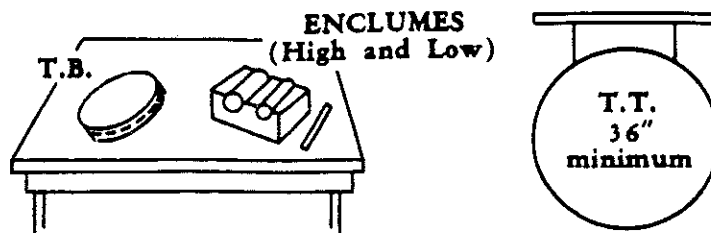
Footnote: Use Hand Cymbals wherever possible. The Suspended cymbal is only an alternative. (With wood sticks.)

11.



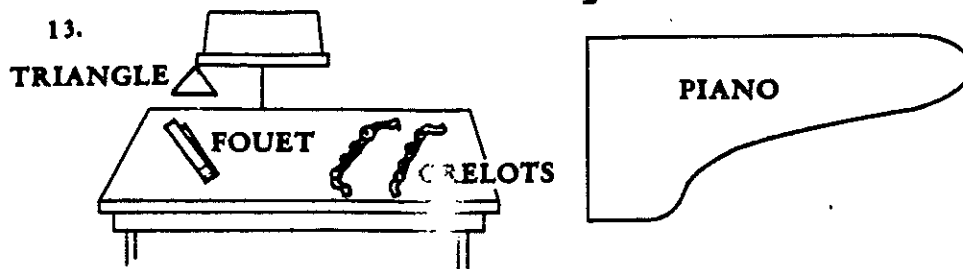
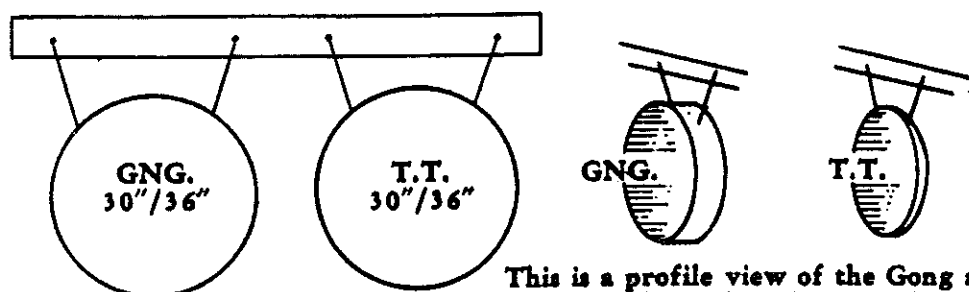
CLOCKENBIE

12.

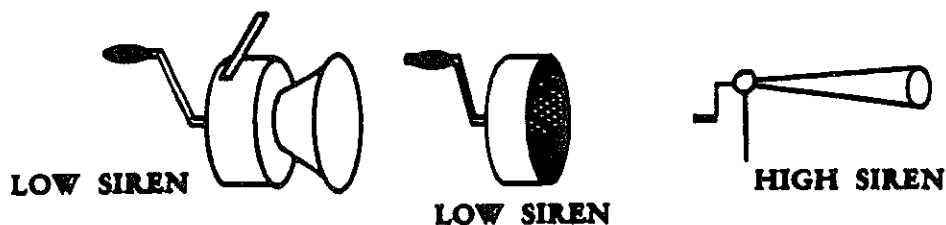


Footnote: See prototype of Anvils at end of page.

13.

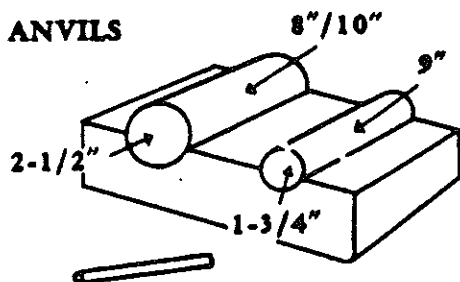
Prototypes

This is a profile view of the Gong and Tam-Tam to show their basic differences.

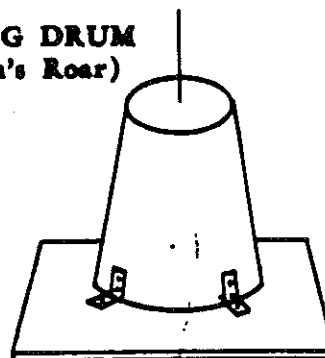


Footnote: With brake equipment.

ANVILS



Footnote: Indentations in holder must be lined with soft felt to obtain maximum of resonance. To obtain resonance hit both tubes simultaneously with beater (small piece of tubing) held by the middle.

STRING DRUM
(Lion's Roar)

ANALYSIS

by Nicolas Slonimsky

Bars 1-8. Introduction. A characteristic figure is sounded by two Bass Drums (laid flat). The Sirens, one high, the other low, enter in rotation, starting from *ppp*, swelling to *mp*. The String-Drum enters in the seventh bar, starting a tremendous crescendo of the Metal Group (Gongs, Tam-tams, Cymbals, Triangle). The crescendo ends abruptly giving way to

The First Subject. Bars 9-12 [1] (with an upbeat). The Tambour Militaire gives out the theme, accompanied by twin Bongos (the Bongos figure may be considered a Countersubject).

Bars 13-16 [2] are bars 1-4 with slight modifications. Bar 17 equals bar 9.

Bars 18-20 [3]. Episode. The Tarole, alternating with the Chinese Blocks, gives out a figure partly derived from the Subject.

Bars 21-26 [4] & [5]. The first Subject is repeated for two bars, continuing in a new figure in Bar 23. The Bongos enter in strict imitation of the Subject, continuing in free counterpoint. The Tarole repeats its episodic figure.

Bar 27 (compound, 2/4 plus 3/8), after a Codetta played by the Chinese Blocks, leads to two 4/4 bars (28 and 29) with thematic figures of the Tambour Militaire. A syncopated Codetta in a 3/8 bar for Claves, leads to the return of 4/4 time (Bar 31). There is a Codetta for the Chinese Blocks in the following 5/4 bar, where the quintuple figure of the second Subject is anticipated.

Bars 33-42 [6] & [7]. 4/4 time. Free episodic development. A sudden outburst of sonority in Bar 38 is continued crescendo.

Bar 43 in 5/8. A Codetta for the Chinese Blocks leads to the second Subject.

Bars 44-50 [8]. Second Subject — a characteristic figure in quintuple sixteenth notes, syncopated, interrupted and doubled, is given out by five players simultaneously (Bongos, Tambour Militaire, Chinese Blocks, Maracas, Tarole). The time-signatures are successively, 3/4, 5/4, 3/4, 5/4, 3/4, 5/8, 4/4.

Bars 51-55 [9] 4/4. All-metal in *p*, *mf* and *f* in various instruments (Anvils, Cymbals, Gongs, Tam-tams, Triangle, accompanied by Sirens). Bars 56-65 [10] & [11] introduce thematic bits in the entire orchestra, leading to an all-metal crash on a fermata in Bar 65.

Bar 66 [12], in 5/4 — another outburst of sound; Bar 67, in 4/4, Pianissimo; Bar 68, in 5/4 repeats Bar 66 with some changes in orchestration.

Bars 69-72 in 4/4. The first Subject reappears in the Tambour Militaire. But instead of the original figure of Bar 9, the Bongos use for counterpoint the figure of the Tambour Militaire in Bar 23.

Bar 73, in 5/4, recalls the second Subject, in two figures of quintuple sixteenth notes. Bar 74, in 3/4, leads through a tremendous crescendo, to Coda. Bars 75-91 [13]

Bars 75-79. Time-signature 4/4. Instruments of definite pitch (Piano, Bells and Glockenspiel à Clavier) enter. The first Subject is re-stated by the Tambour Militaire. Bar 80, in 2/4, contains a Codetta for Chinese Blocks. Bars 81-82, in 3/4, have a solo for the Tarole. Bars 83-91 repeat thematic bits of the first Subject. The conclusion is in pianissimo, on a long fermata.

IONISATION

(for Percussion Ensemble of 13 Players)

Edgard Varèse

 $\text{♩} = 69$

Grande Cymbale Chinoise

Grosse Caisse (très grave)

Gong

Tam-tam clair

Tam-tam grave

Baguettes Timbales (en peau)

2 Bûches { clair
 grave

Caisse Milante

2 Grosse Caisse { moyenne
 grave

Tambour militaire

Caisse roulante

Sirène claire

Tambour à corde

Sirène grave

Fosse

Gâiro

3 Blocs Chinois { clair
 moyen
 grave

Claves

Triangle

Caisse claire (définitive)

2 Maracas { Clair
 Grave

Tarule

Caisse claire

Cymbale suspendue

Grelots

Cymbales

Gâiro

Castagnettes

Tambour de Basque

Enclumes

Piano

1. Grande Cymbale Chinoise
(Grosse Caisse (très grave))

2. Gong
Tam-tam clair
Tam-tam grave

3. 2 Bongos... clair
Caisse Roulante grave
2 Grosse Caisse moyenne grave

4. Tambour militaire
Caisse roulante

5. Sirène claire
Tambour à corde

6. Sirène grave
Fouet
Güiro

7. 3 Blocs Chinois clair moyen grave
Claves
Triangle

8. Caisse claire
2 Maracas... Claire Grave

9. Tarole
Caisse claire
Cymbale suspendue

10. Grelots
Cymbales

11. Güiro
Castagnettes

12. Tambour de Basque
Enclumes...

13. Piano

10

1. Grande Cymbale Chinoise
(Grosse Caisse (très grave))

2. Gong
Tam-tam clair
Tam-tam grave

3. 2 Bongos... clair
grave
Caisse Routante
2 Grosse Caisse... moyen
grave

4. Tambour militaire
Caisse roulante

5. Sirène claire
Tambour à corde

6. Sirène grave
Fouet
Güiro

7. 3 Blocs Chinois... clair
moyen
grave
Claves
Triangle

8. Caisse claire
2 Maracas... Claire
Grave

9. Tarole
Caisse claire
Cymbale suspendue

10. Grelots
Cymbales

11. Güiro
Castagnettes

12. Tambour de Basque
Rochettes...

13. Piano

4

1. Grande Cymbale Chinoise
Grosse Caisse (très grave)

2. { Gong
Tam-tam clair
Tam-tam grave

3. { 2 Bongos... { clair
Caisse Routante { grave
2 Grosse Caisse { moyenne
grave

4. { Tambour militaire
Caisse roulante

5. { Sirène claire
Tambour à corde

6. { Sirène grave
Fouet
Güiro

7. { 3 Blocs Chinois { clair
Claves { moyen
Triangle { grave

8. { Caisse claire
2 Maracas { Claire
Grave

9. { Tarole
Caisse claire
Cymbale suspendue

10. { Grelots
Cymbales

11. { Güiro
Castagnettes

12. { Tambour de Basque
Exclumes.....

13. Piano

Baquettes Timbales en Bois

Baquettes Timbales en Fer

Fouet

p

12

1. Grande Cymbale Chinoise
(Grosse Caisse (très grave))

2. Gong
Tam-tam clair
Tam-tam grave

3. 2 Bongos..... clair
Caisse Roulotte grave
2 Grosse Caisse moyenne
grave

4. Tambour militaire
Caisse roulante

5. Sirène claire
Tambour à corde

6. Sirène grave
Fouet
Gäiro

7. 3 Blocs Chinois clair
moyen
grave
Claves
Triangle

8. Caisse claire
2 Maracas Claire
Grave

9. Tarole
Caisse claire
Cymbale suspendue

10. Grelots
Cymbales

11. Gäiro
Castagnettes

12. Tambour de Basque
Enclumes.....

13. Piano

Fouet

1. Grande Cymbale Chinoise
(Grosse Caisse très grave)

2. { Gong
Tam-tam clair
Tam-tam grave

3. { 2 Bongos { clair
grave
Caisse Roulante
(2 Grosse Caisse) { moyenne
grave

4. { Tambour militaire
Caisse roulante

5. { Sirène claire
Tambour à court

6. { Sirène grave
Pouet
Güiro

7. { 3 Blocs Chinois { clair
moyen
grave
Claves
Triangle

8. { Caisse claire
2 Maracas { Claire
Grave

9. { Tarole
Caisse claire
Cymbale suspendue

10. { Grelots
Cymbales

11. { Güiro
Castagnettes

12. { Tambour de Basque
Enclumes.....

13. Piano

1... {Grosse Cymbale Châssée
(Grosse Cymbale très grave)

2... {Gong
Tam-tam clair
Tam-tam grave

3... {2 Bongos... {clair
grave
Caisse Routante
2 Grosse Caisse {moyenne
grave

4... {Tambour militaire
Caisse roulante

5... {Bière claire
Tambour à corde

6... {Bière grave
Pouet
Gâire

7... {3 Bires Chinois {clair
moyen
grave
Claves
Triangle

8... {Caisse claire
2 Maracas {Clair
Grave

9... {Tarele
Caisse claire
Cymbale suspendue

10... {Grelots
Cymbales

11... {Gâire
Castagnettes

12... {Tambour de Basque
Enclumes...

13... Piano

1. Grande Cymbale Chinoise
Grande Caisse (très grave)

2. Gong
Tam-tam clair
Tam-tam grave

3. 2 Bongos... clair
Caisse Rouillante grave
2 Grandes Caissees moyenne grave

4. Tambour militaire
Caisse rouillante

5. Sirène claire
Tambour à corde

6. Sirène grave
Fouet
Giro

7. 3 Blocs Chinois clair
Claves moyen grave
Triangle

8. Caisse claire
2 Maracas Claire
Grave

9. Tirolo
Caisse claire
Cymbale suspendue

10. Grelots
Cymbales

11. Giro
Castagnettes

12. Tambour de Baïque pour
Enclumes

13. Piano

Augmentation de l'intensité en pose

Augmentation Tambour

Triangle
Grelots

16

7

1. { Cencerro
Grosse Caisse très grave

2. { Cencerro
Tam-tam clair
Tam-tam grave

3. { 2 Bongos... { clair
Caisse Roullante { grave
2 Grosses Caisse { moyenne
{ grave

4. { Tambour militaire
Caisse roullante

5. { Sirène claire
Tambour à corde

6. { Sirène grave
Fouet
Güiro

7. { 3 Blocs Chinois { clair
{ moyen
{ grave
Claves
Triangle

8. { Caisse claire
2 Maracas { Claire
{ Grue

9. { Tarole
Caisse claire
Cymbale suspendue

10. { Grelots
Cymbales

11. { Güiro
Castagnettes

12. { Tambour de Basque
Exclumes...

13. Piano

1. Cencerro
(Grasse Caisse (très grave))

2. Cencerro
Tam-tam clair
Tam-tam grave

3. 2 Bongos..... clair
Caisse Roulante grave
2 Grandes Caisse moyenne grave

4. Tambour militaire
Caisse roulante

5. Sirène claire
Tambour à corde

6. Sirène grave
Fouet
Güir

7. 3 Blocs Chinois clair
Claves moyen grave
Triangle

8. Caisse claire
2 Maracas Claire
Grave

9. Tarole
Caisse claire
Cymbale suspendue

10. Grelots
Cymbales

11. Güiro
Castagnettes

12. Tambour de Basque
Enclumes.....

13. Piano

8

Baguettes Tumbées en bois

18

1. { Cencerro
(Grosse Caisse très grave)

2. { Cencerro
Tam-tam clair
Tam-tam grave

3. { 2 Bongos... clair
grave
Caisse Routante
2 Grosses Caisse (moyenne
grave)

4. { Tambour militaire
Caisse roulante

5. { Sirène claire
Tambour à corde

6. { Sirène grave
Fouet
Güiro

7. { 3 Blocs Chinois (clair
moyen
grave)
Claves
Triangle

8. { Caisse claire
2 Maracas (Clair
Grave)

9. { Tarole
Caisse claire
Cymbale suspendue

10. { Grelots
Cymbales

11. { Güiro
Castagnettes

12. { Tambour de Basque
Reclames

13. Piano

9

1. Cencerro
Grasse Chasse très grave

2. Cencerro
Tum-tam clair
Tain-tam grave

3. 2 Bongos... clair
Grasse Roulante grave

4. Tambour militaire
Caisse roulante

5. Sirène claire
Tambour à corde

6. Sirène grave
Fouet
Güiro

7. 3 Bloos Chinois clair
Claves moyen
Triangle grave

8. Caisse claire
2 Maracas Claire
Grave

9. Tarole
Caisse claire
Cymbale suspendue

10. Grelots
Cymbales

11. Güiro
Castagnettes

12. Tambour de Basque
Enclaves

13. Piano

20

1... (Grande Cymbale Chinoise)
(Grosse Caisse (très grave))

2..... { Gong
Tam-tam clair
Tam-tam grave

3 { 2 Bongos..... { clair
Caisse Roullante grave
2 Grosse Caisse (très grave)

4..... { Tambour militaire
Caisse roulante

5..... { Sirène clair
Tambour à corde

6..... { Sirène grave
Fouet
Gâiro

7.. { 3 Blocs Chinois { clair
Claves moyen
Triangle, grave

8..... { Caisse claire
2 Maracas { Claire
Grave

9... { Tarole
Caisse claire
Cymbale suspendue

10..... { Grelots
Cymbales

11..... { Gâiro
Castagnettes

12... { Tambour de Basque
Enchumes.....

13..... Piano

10

Agustín Timbalas en peso

11

1. Grande Cymbale Chinoise
(Grosse Caisse (très grave))

2. Gong
Tam-tam clair
Tam-tam grave

3. 2 Bongos (clair
grave)
Caisse Roulante
2 Grosses Caissees (moyenne
grave)

4. Tambour militaire
Caisse roulante

5. Sirène claire
Tambour à corde

6. Sirène grave
Fouet
Güiro

7. 3 Blocs Chinois (clair
moyen
grave)
Claves
Triangle

8. Caisse claire
2 Maracas (Clair
Grave)

9. Tarole
Caisse claire
Cymbale suspendue

10. Grelots
Cymbales

11. Güiro
Castagnettes

12. Tambour de Basque
Enclumes.....

13. Piano

1. Grande Cymbale Chinoise
(Grosse Caisse (très grave))

2. Gong
Tam-tam clair
Tam-tam grave

3. 2 Bongos clair
grave
Caisse Roullante
2 Grosse Caissees moyen
grave

4. Tambour militaire
Caisse roullante

5. Sirène claire
Tambour à corde

6. Sirène grave
Pout
Géiro

7. 3 Blocs Chinois clair
moyen
grave
Claves
Triangle

8. Caisse claire
2 Maracas Claire
Grave

9. Tarole
Caisse claire
Cymbale suspendue

10. Grelots
Cymbales

11. Géiro
Castagnettes

12. Tambour de Basque
Enclumes

13. Piano

The musical score is written on 13 staves, each corresponding to a different percussion instrument or group of instruments. The notation includes various rhythmic values (quarter, eighth, sixteenth notes, rests), dynamic markings (pp, p, f), and articulation marks (accents, slurs). The instruments listed are: 1. Grande Cymbale Chinoise and Grosse Caisse (très grave); 2. Gong, Tam-tam clair, and Tam-tam grave; 3. 2 Bongos (clair and grave), Caisse Roullante, and 2 Grosse Caissees (moyen and grave); 4. Tambour militaire and Caisse roullante; 5. Sirène claire and Tambour à corde; 6. Sirène grave, Pout, and Géiro; 7. 3 Blocs Chinois (clair, moyen, and grave), Claves, and Triangle; 8. Caisse claire and 2 Maracas (Claire and Grave); 9. Tarole, Caisse claire, and Cymbale suspendue; 10. Grelots and Cymbales; 11. Géiro and Castagnettes; 12. Tambour de Basque and Enclumes; 13. Piano.

12

1. Grande Cymbale Chinoise
Grosse Caisse (très grave)

2. Gong
Tam-tam clair
Tam-tam grave

3. 2 Bongos... clair
grave
Caisse Roulante
2 Grosse Caisse... moyenne
grave

4. Tambour militaire
Caisse roulante

5. Sirène claire
Tambour à corde

6. Sirène grave
Fonot
Güiro

7. 3 Blocs Chinois... clair
moyen
grave
Claves
Triangle

8. Caisse claire
2 Maracas... Claire
Grave

9. Tarole
Caisse claire
Cymbals suspendue

10. Grelots
Cymbales

11. Güiro
Castagnettes

12. Tambour de Basque
Enclumes...

13. Piano

1. Grande Cymbale Chinoise
Grosse Caisse (très grave)

2. Gong
Tam-tam clair
Tam-tam grave

3. 2 Bongos (clair/grave)
Caisse Roulante
2 Grosse Caisse (moyenne/grave)

4. Tambour militaire
Caisse roulante

5. Sirène claire
Tambour à corde

6. Sirène grave
Fouet
Gâiro

7. 3 Blocs Chinois (clair/moyen/grave)
Claves
Triangle

8. Caisse claire
2 Maracas (clair/grave)

9. Tarole
Caisse claire
Cymbale suspendue

10. Grelots
Cymbales

11. Gâiro
Castagnettes

12. Tambour de Basque
Enclumes

13. Piano

Prenez Tam-tam clair

Prenez Cloches

Prenez Glockenspiel

Prenez Tam-tam

26

♩ = 52

[13]

1. { Tam-tam clair
Grosse Caïssa (très grave)

2. { Gong
Tam-tam grave

3. { 2 Bongos..... { clair
 grave
Caïssa Roulante
2 Grosse Caïssa { moyenne
 grave

4. { Tambour militaire
Caïssa roulante

5. { Sirène claire
Tambour à corde

6. { Sirène grave
Fouet
Gâiro

7. { 3 Bells Chinois { clair
 moyen
 grave
Cloves
Triangle

8. { Caïssa claire
2 Maracas { Claire
 Grave

9. { Tarole
Caïssa claire
Cymbale suspendue

10. Cloches

11. ... Glockenspiel à clavier
(with resonators)

12. ... Grand Tam-tam
(très profond)

13. Piano

Pédale

Augmentation Timbales épouffées

Poussi

Sonne à la double 8va

attaque sèche (parrutée), Lettres vibrer, durée indiquée

1. Tam-tam clair
Grosse Caisse (très grave)

2. Gong
Tam-tam grave

3. 2 Bongos..... clair
Caisse Roullante grave
2 Grosses Caissees moyenne
grave

4. Tambour militaire
Caisse roulante

5. Sirène claire
Tambour à corde

6. Sirène grave
Fouet
Güiro

7. 3 Blocs Chinois clair
moyen grave
Claves
Triangle

8. Caisse claire
2 Maracas Claire
Grave

9. Tarole
Caisse claire
Cymbale suspendue

10. Cloches

11. Glockenspiel

12. Grand Tam-tam
(très profond)

13. Piano

1. Historical Background: *Poème électronique* (1956–58) was composed at the Philips Studio at Eindhoven, having been commissioned for performance in the Philips Pavilion at the 1958 Brussels Worlds Fair. The pavilion was designed by the French architect Le Corbusier (who was assisted, interestingly enough, by then architect Iannis Xenakis. The design of the

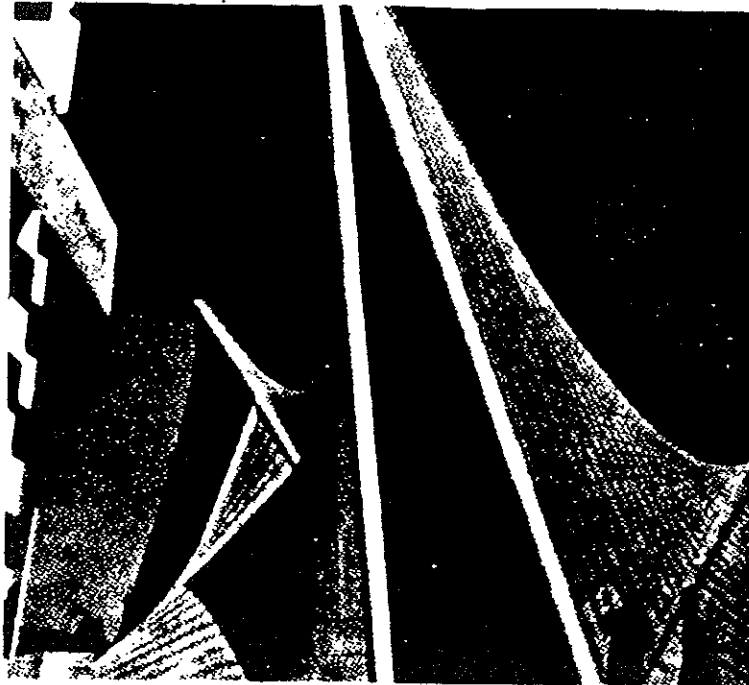


Figure 7.30. The Philips Pavilion at the Brussels Exposition (World's Fair) built by Le Corbusier where *Poème électronique* was first performed in 1958.

"I have been waiting a long time for electronics to free music from the tempered scale and the limitations of musical instruments. Electronic instruments are the portentious first step toward the liberation of music."
— Varèse

pavilion included 400 or more loudspeakers, most of which were hidden in the walls or above the ceilings. David Ernst speaks of the elaborate setup:

The taped sounds were distributed by telephone relays among various combinations of loudspeakers. These "sound paths" were determined by a fifteen channel control tape, each track of which contained twelve separate signals. Therefore 180 (15 × 12) control signals were available to regulate the sound routes, lighting effects and a variety of light sources which consisted of film projectors and projection lanterns, spotlights, ultraviolet lamps, bulbs, and fluorescent lamps of various colors.²¹

Nearly 16,000 people per day for six months provided an audience for the performance of this work of purely taped sounds (both *musique concrète* and electronic sources). The projected images (various photographs of paintings, script, or other montages) were not synchronized with the sound in any particular manner (the projections were chosen by Le Corbusier to fit the elaborate and complex internal design of the pavilion).

2. Overview: Varèse often referred to his work as "organized sound" rather than traditional composition. Clearly *Poème électronique* is very highly organized sound. One method of analyzing electronic music visually "keys" certain sounds so that "paper" analysis becomes possible. Figure 7.31 shows one possible such "keying."

While there are obviously more than seven different sound sources and variants present in this piece, one can clearly identify the ones shown here as basic to its structure. The visual identities are drawn to resemble in some way the aural image presented or in some cases the instruments suggested by the sounds.

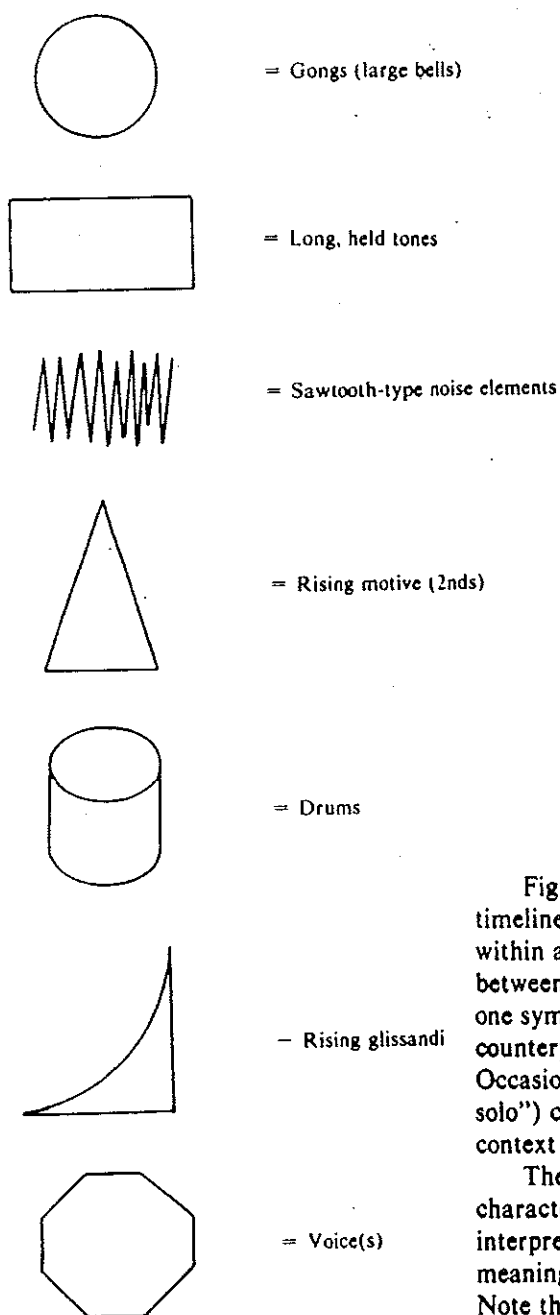
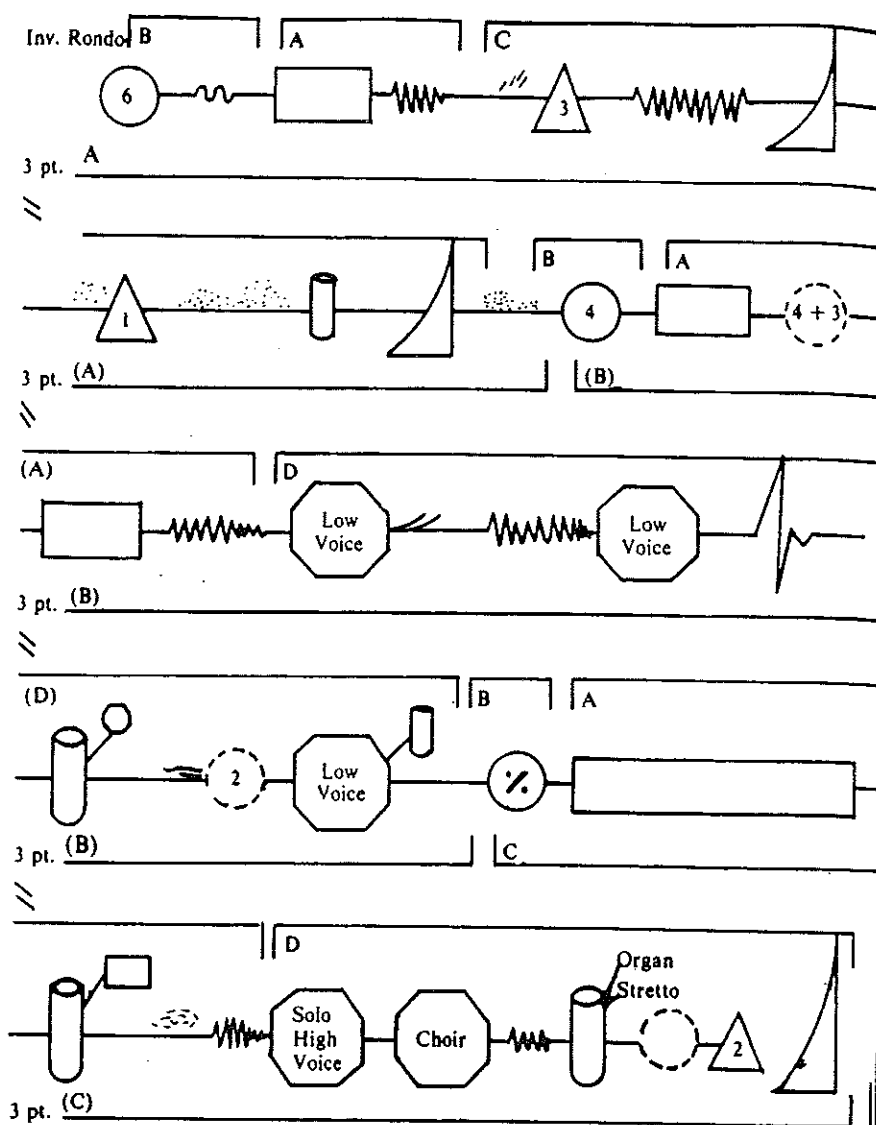


Figure 7.31. Key to diagrams used in figure 7.32.

Figure 7.32 shows how these symbols can be organized to represent a timeline of the piece (left-to-right, top-to-bottom). Occasional numbers within a diagram represent repetitions of a sound. Assorted "doodlings" between connections represent important but nonformal materials. When one symbol becomes an offshoot of another symbol, it represents a counterpoint, with the first stated material being more significant. Occasional reference to subjects represented by words (e.g., "low voice solo") clearly identify important characteristics that are varied in the context of the work.

The form of the piece takes two distinct shapes. First one perceives a characteristic rondo (return) quality even on first hearing. One such interpretation is shown above the symbols: the "inverted rondo" (here meaning that the main repeating sequence appears second rather than first). Note that the "A" portion repeats twice (occurs three times) in the body of the work between sections of other materials (some of which, like "B," also

Figure 7.32. Diagrammatic formal analysis of Varèse's *Poème électronique*.



repeat). At least two other rondo possibilities exist here: one, with the opening gongs being "A" and occurring three main times with two "shadow" occurrences; and two, with the rising motive (the triangle) as the main idea (A) occurring on three different occasions.

A second possibility is shown (under the symbols) as "three-part." Here the form is defined as sectional (in three large parts), with each part beginning in nearly the same manner (i.e., gongs followed by long held notes). This separate and distinct formal possibility (from the rondo interpretation discussed above) should not be discarded even though it is less audible on first hearing.

3. **Orchestration Techniques:** Varèse uses two basic sound materials: *concrète* and electronic. Within each of those categories there are two main divisions: *concrète*, instrumental and vocal; electronic, sine-type tones (simple resonances) and complex (nearly noise) elements. His techniques of variation within these timbres are extremely subtle. A good example of this is the way in which he varies the initial six attacks of the gong-type motive at the beginning of the work. The sixth sound is filtered so that it sounds nearly an octave lower in pitch. The reverberation characteristic, as well as timbre of each of the bells is clearly different in the succeeding appearances of the motivic structure.
4. **Basic Techniques:** Most techniques presented here are a by-product of *classical* tape composition discussed earlier in this chapter. Most notable in *Poème électronique* are the tape speed changes (N. B.: the solo female entrance where her range is extended beyond human potential), envelope control (cutoffs on the opening long note section, for example, show strong hints of editing executions), synchronization (e.g., the fast switching between drums and organ in the final stretto), and other techniques typical of this period of electronic composition.
- 5, 6. **Vertical and Horizontal Models:** Neither of these categories is particularly important in a work whose sonorities are determinates of chosen percussive materials. However, the final "long note" section before the entrance of the low-voice solo clearly defines the harmonic context of the piece (near overtone information and of complex [upper partials] definition). The horizontal materials that most noticeably represent clear identities suggest either secondal (in seconds, minor or major) or widely leaping pointillistic diversity.
7. **Style:** *Poème électronique* represents an important work (along with Stockhausen's *Gesang der Jünglinge*, 1954) in the hybridization of electronic principles which are highly organized and defined. The recognizable sounds (jet airplane, drums, temple bells, human voices, for example) represent an interesting layer of separate identities, which, along with the often humorous "squeaks and squawks," present a dynamic and linear design not unlike the composer's instrumental works of earlier vintage.

This classic of the electronic music genre compares favorably in concept and stylistic approach to both the works presented in the Vectoral Analyses of Chapter 9 (Risset) and Chapter 3 (Penderecki). In the former case, the centrality of interest in timbre and the electronic medium resemble one another. In the latter case, even though Penderecki's work does not employ electronics of any kind, there are abstract sonorities that create new resonances and hence a vertical sense of depth. While the technology of Varèse's use of electronics suggests a very different kind of music than appeared in his earlier *Density 21.5* (see Vectoral Analysis of Chapter 1), one finds much of the same lyrical and phrase structure present.

Threnody

To the Victims of Hiroshima
for 52 strings

Threnos

Den Opfern von Hiroshima
für 52 Saiteninstrumente

COMMUNITY COLLEGE OF RHODE ISLAND
Flanagan Campus Music Department

Abkürzungen und Symbole

Abbreviations and symbols

Erhöhung um einen Viertelton sharpen a quarter-tone	
Erhöhung um einen Dreiviertelton sharpen three quarter-tones	
Erniedrigung um einen Viertelton flatten a quarter-tone	
Erniedrigung um einen Dreiviertelton flatten three quarter-tones	
höchster Ton des Instrumentes (unbestimmte Tonhöhe) highest note of the instrument (no definite pitch)	
zwischen Steg und Saitenhalter spielen play between bridge and tailpiece	
Arpeggio zwischen Steg und Saitenhalter (4 Saiten) arpeggio on 4 strings behind the bridge	
auf dem Saitenhalter spielen (arco), Bogenstrich über den Saitenhalter (in einem Winkel von 90° zu dessen Längsachse) play on the tailpiece (arco) by bowing the tailpiece at an angle of 90° to its longer axis	
auf dem Steg spielen (arco), Bogenstrich über das Holz des Steges senkrecht zu dessen rechter Schmalseite play on the bridge by bowing the wood of the bridge at a right angle at its right side	
Schlagzeugeffekt: mit dem Frosch oder mit der Fingerspitze auf die Decke klopfen Percussion effect: strike the upper sounding board of the violin with the nut or the finger-tips	
mehrere unregelmäßige Bogenwechsel several irregular changes of bow	
molto vibrato	
sehr langsames Vibrato mit 1/4 Ton-Frequenzdifferenz durch Fingerverschiebung very slow vibrato with a 1/4 tone frequency difference produced by sliding the finger	
sehr schnelles, nicht rhythmisiertes Tremolo very rapid non rhythmized tremolo	
ordinario	ord.
sul ponticello	s. p.
sul tasto	s. t.
col legno	c. l.
legno battuto	l. batt.

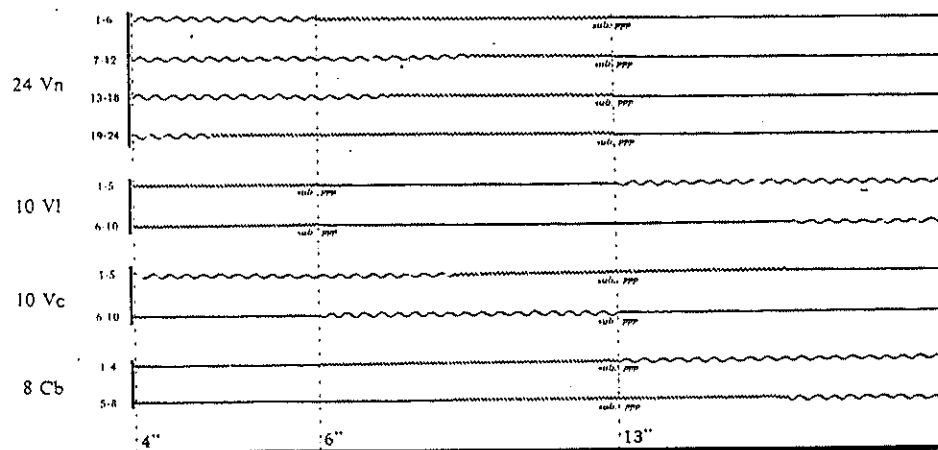
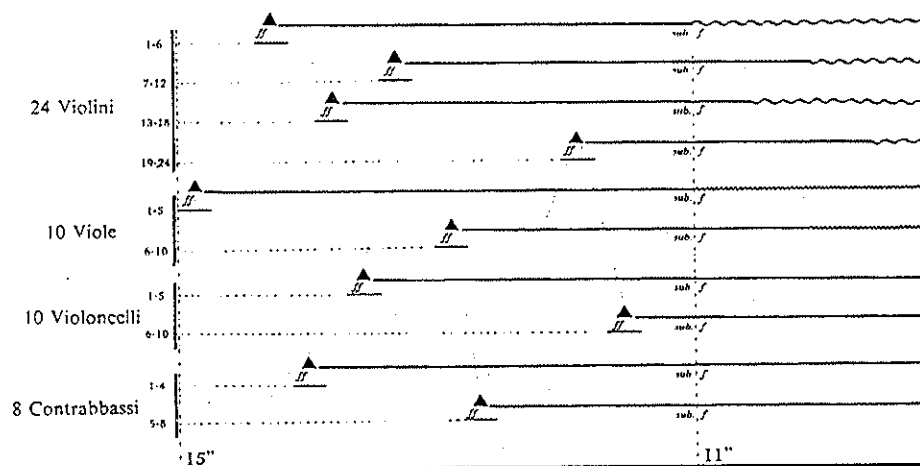
Chapter 8: Sound Mass

Orchestra

24 Violini (Vn)
10 Viole (Vi)
10 Violoncelli (Vc)
8 Contrabbassi (Cb)

Krzysztof Penderecki
Threnos
Den Opfern von Hiroshima

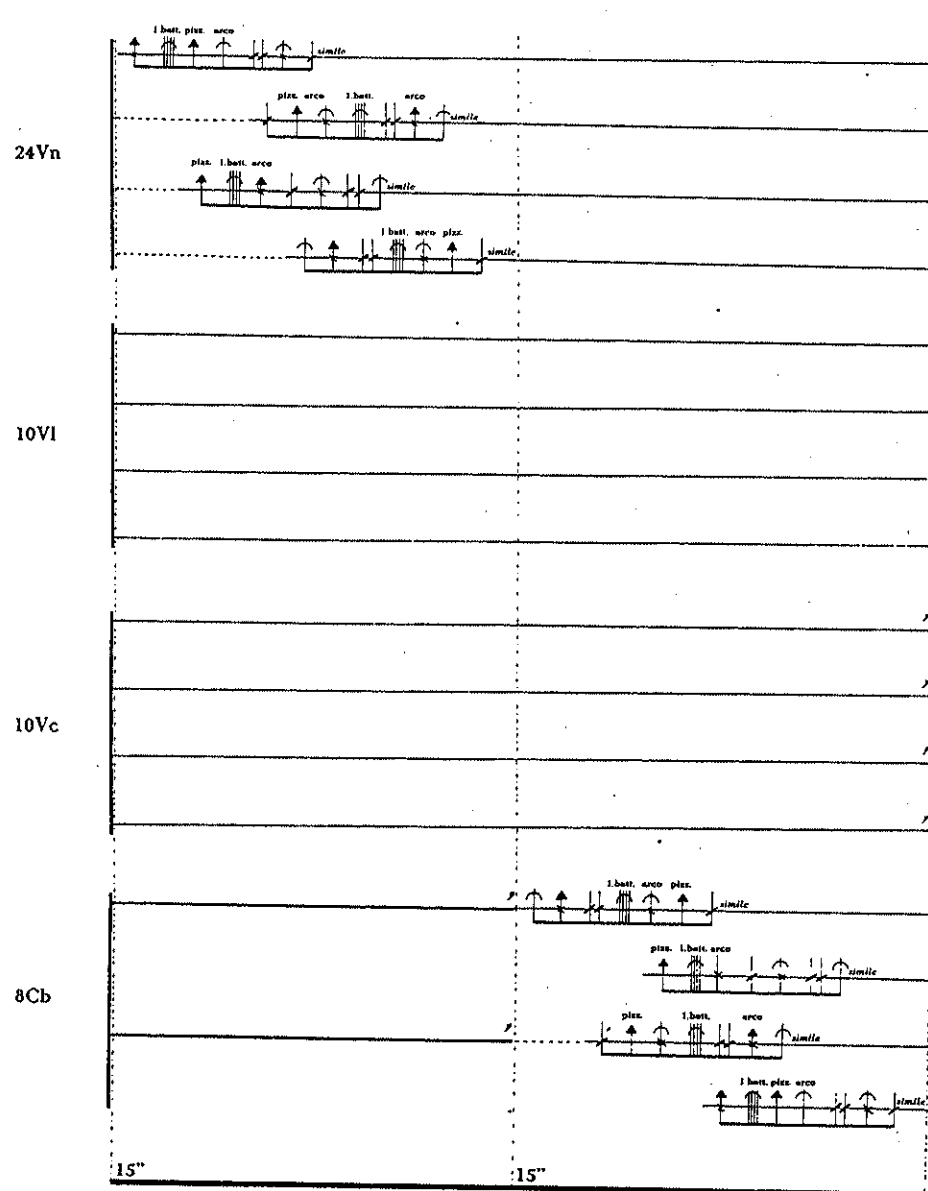
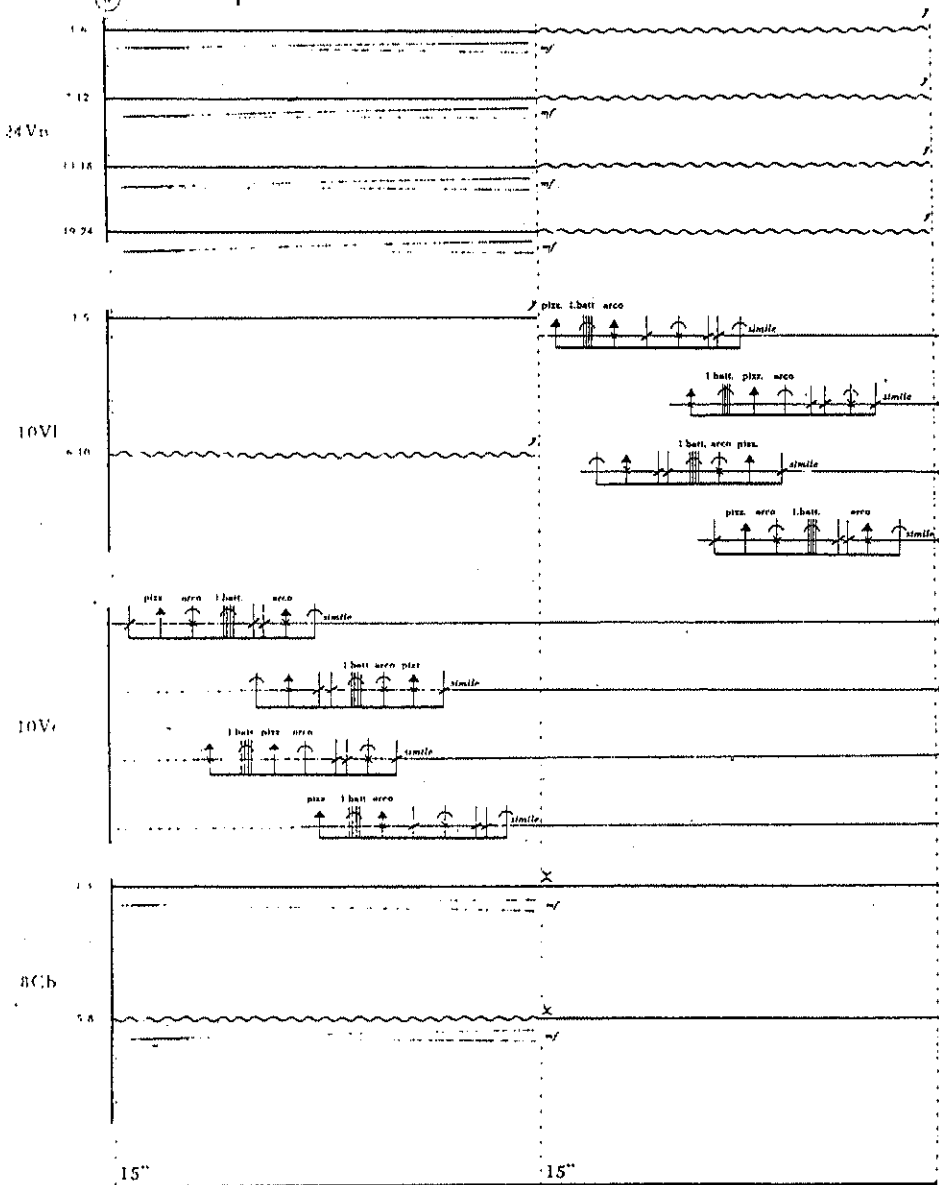
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SB902

Chapter 8: Sound Mass



Chapter 8: Sound Mass

24Vn

10Vi

10Vc

8Cb

1-12

13-24

1-10

1-8

15"

25"

20"

24Vn

10Vi

10Vc

8Cb

1-12

13-24

1-10

1-8

15"

20"

10"

61

SB902

16

12Vn

10VI

10Vc

8Cb

18" 20"

Detailed description: This page shows the musical notation for measures 16 through 20. It includes parts for 12 Violins (12Vn), 10 Violas (10VI), 10 Violas/Celli (10Vc), and 8 Cellos (8Cb). The notation includes staves with notes, rests, and dynamic markings such as *ff*, *sub. pp*, and *gliss.*. Measure numbers 16, 17, 18, 19, and 20 are indicated at the bottom of the staves.

18

12Vn

10VI

10Vc

8Cb

20"

Detailed description: This page shows the musical notation for measures 18 through 20. It includes parts for 12 Violins (12Vn), 10 Violas (10VI), 10 Violas/Celli (10Vc), and 8 Cellos (8Cb). The notation includes staves with notes, rests, and dynamic markings such as *ff*, *sub. pp*, and *gliss.*. Measure numbers 18, 19, and 20 are indicated at the bottom of the staves.

Chapter 8: Sound Mass

12Vn 1-12

12Vn 13-24

10VI 1-10

10Vc 1-10

8Cb 1-8

15''

7''

5''

gliss.

fff

fff

20

23

Solo

subr.

5Vc 1-5

5Vc 6-10

pp

pppp

10''

7''

10''

5''

20

63

4Vn

3V1

3Vc

2Cb

I

II

III

IV

15''

32

4Vn

3VI

3Vc

2Cb

15"

Chapter 8: Sound Mass

38

4Vn 13, 14, 15, 16

3VI 1, 2, 3

3Vc 1, 2, 3

2Cb 1, 2

4Vn 17, 18, 19, 20

3VI 4, 5, 6

3Vc 4, 5, 6

2Cb 3, 4

15"

44

4Vn 13, 14, 15, 16

3VI 1, 2, 3

3Vc 1, 2, 3

2Cb 1, 2

4Vn 17, 18, 19, 20

3VI 4, 5, 6

3Vc 4, 5, 6

2Cb 3, 4

4Vn 21, 22, 23, 24

3VI 7, 8, 9

3Vc 7, 8, 9

2Cb 5, 6

15"

Chapter 8: Sound Mass

50

4Vn

3VI

3Vc

2Cb

15"

56 arco

4Vn

3VI

3Vc

2Cb

10"

65

Chapter 8: Sound Mass

12Vn 1-12

4Vn 13-16

3VI 1-3

3Vc 1-3

4Vn 17-20

3VI 4-6

3Vc 4-6

4Vn 21-24

3VI 7-9

3Vc 7-9

10Vc 1-10

8Cb 1-8

5"

5"

SB902

12Vn 1-12

10VI 1-10

10Vc 1-10

8Cb 1-8

4Cb 1-4

10"

6"

10"

Chapter 8: Sound Mass

12Vn I-12

12Vn

10Vl I-10

10Vc I-10

8Cb I-8

6''

8''

10''

70

sp
nv

ord.

s.f.

tutti
archi

pppp

24Vn 1-24

10VI 1-10

10Vc 1-10

8Cb 1-8

30"